the OIL AND GAS JOURNAL

TRET-O-LITE

has long been recognized as the best buy in crude oil demulsification. This recognition has been earned by many years of practical performance, supervised by the largest staff of trained dehydrating engineers in the world. You can prove this statement easily and to your own advantage — just call your Tretolite service engineer on your next treating or corrosion problem.

TC 51-4

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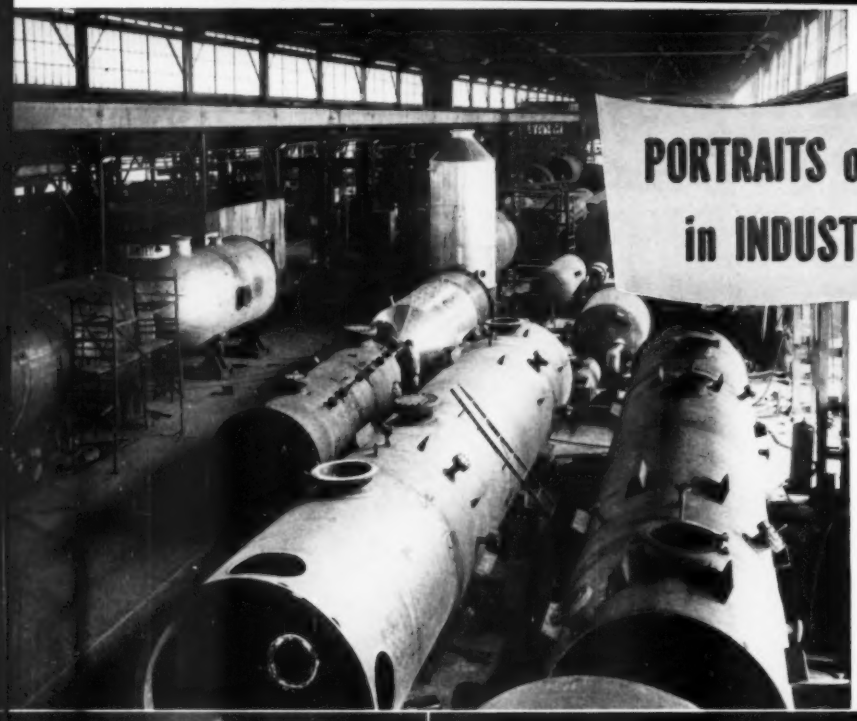
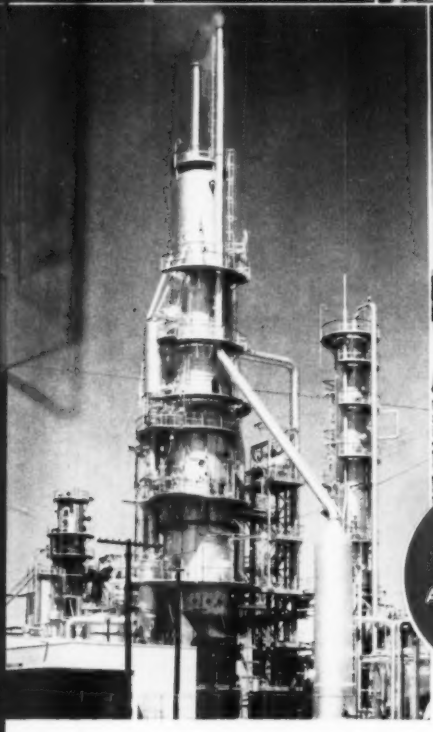
PRICE 50 CENTS TABLE OF CONTENTS PAGE 53 **DECEMBER 13, 1951**



PORTRAITS of PROGRESS
in INDUSTRY TODAY



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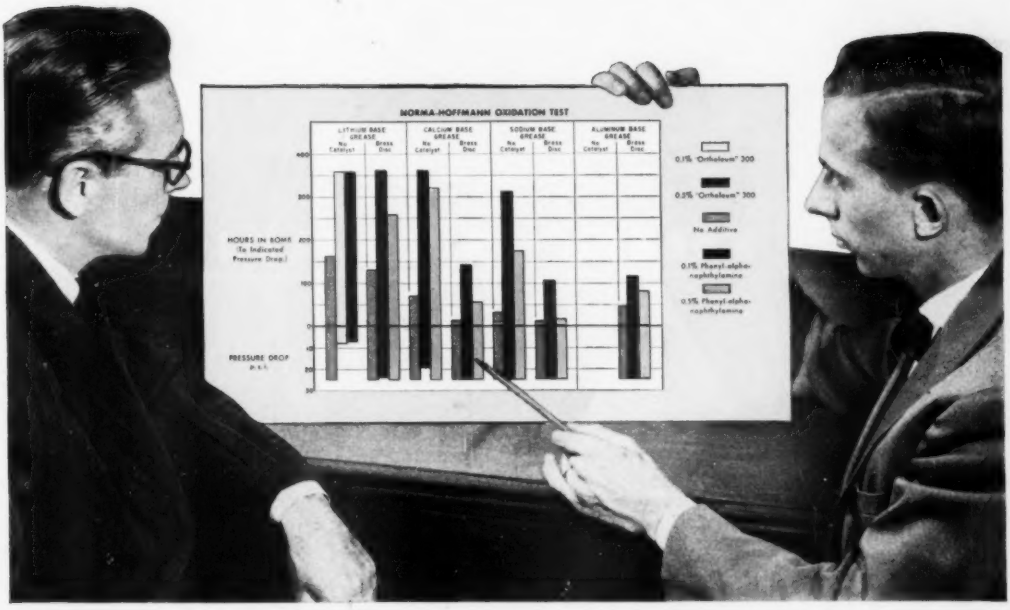

YOUR CHOICE OF TWO DU PONT ADDITIVES FOR LOW-COST GREASE STABILIZATION

The demand for greater stability in greases is constantly increasing. This is due to the higher operating speeds and temperatures of modern equipment. To help you meet these conditions, and to increase the stability of your greases economically, Du Pont offers "Ortholeum" 300 and Phenyl-alpha-naphthylamine.

DU PONT "ORTHOLEUM" 300 supplies both antioxidant and metal deactivating properties. The result of this combination is outstanding where metal catalysis is a factor. On the other hand, "Ortholeum" 300 also shows marked superiority over Phenyl-alpha-naphthylamine in many non-catalyzed systems, as indicated in the Norma Hoffman comparison.

In many greases "Ortholeum" 300 provides high resistance to color deterioration, even under long exposure to light. It can either be added directly, or in an oil concentrate just prior to the final cooling period. For normal requirements, the treating cost of grease is under ½¢ per pound.

DU PONT PHENYL-ALPHA-NAPHTHYLAMINE gives excellent results in most non-catalyzed systems when the superior color stability of "Ortholeum" 300 is not essential. In equal concentrations, its lower price per pound means lower treating costs, too.

Since greases vary widely in their composition, their response to different stabilizers varies also, and the degree of stabilization required for different applications varies as well. Under the circumstances it will pay you to evaluate each of these two Du Pont additives in all of your greases —on the basis of quality as well as economy.

SAMPLES of "Ortholeum" 300 and Phenyl-alpha-naphthylamine are yours for the asking. Simply contact your Petroleum Chemicals Representative, or address your request to the Du Pont District Office nearest you.

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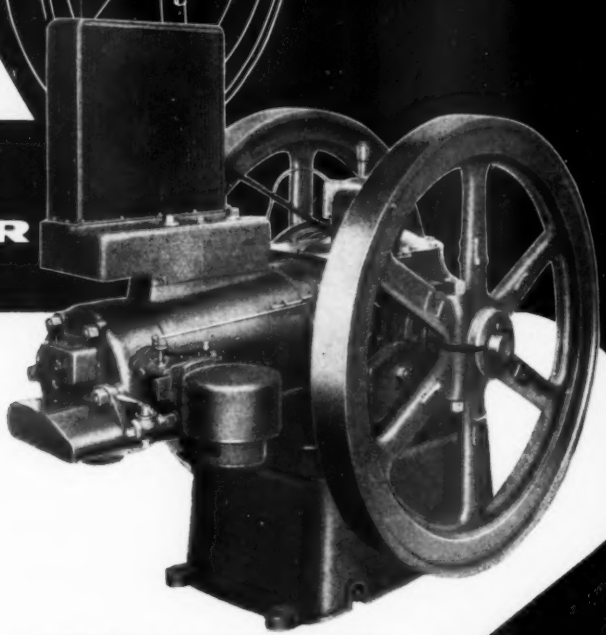
IN CANADA: Canadian Industries Limited—Toronto, Ont.—Montreal, Que.

The Oil and Gas Journal, published Thursdays by The Petroleum Publishing Company. Entered as second-class matter September 1, 1910 at post office at Tulsa, Okla., under act of March 3, 1879. U. S. and foreign rates to the petroleum industry, $3 yearly. Copyright 1951

THIS BALANCE ...IS IN YOUR FAVOR



Two flywheels mean better balance . . . more stability on the mounting pedestal. No chance with a "ZC" for unbalanced flywheel effect to cause the engine to work loose from its mounting.

An outstanding performance advantage of the Fairbanks-Morse "ZC" is the *balanced* power output you get with the TWO big flywheels located between the engine and the pumping gear unit. And with TWO flywheels, you can drive from either side of the engine.

Load fluctuations are "smoothed out" by the properly proportioned flywheels, while the power of the engine remains constant. The flywheels store excess energy on the down stroke of the rods . . . then use this stored energy to equalize the load at the peak demand of the up stroke. You not only get smoother pumping . . . you protect engine and driven equipment against overload and abuse.

For the complete story on the "ZC," and the broad range of sizes, see your local supply store or write Fairbanks, Morse & Co., 600 S. Michigan Ave., Chicago 5, Ill.

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OIL FIELD EQUIPMENT • PUMPS • SCALES • ELECTRIC MOTORS • GENERATORS • LIGHT PLANTS • DIESEL, DUAL FUEL AND GASOLINE ENGINES • MAGNETOS • DIESEL LOCOMOTIVES

For **better** service and **more** economy

Order from a thousand and one

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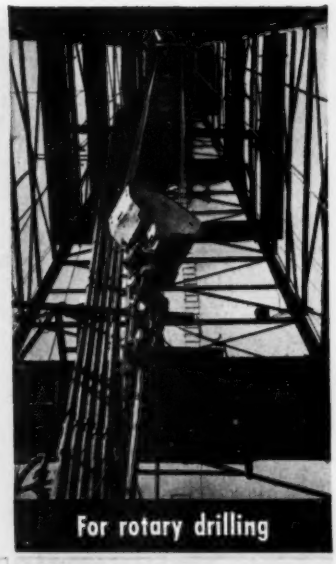
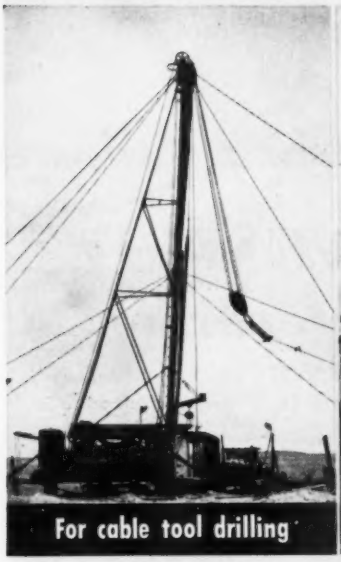


For rotary drilling



For cable tool drilling

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For pipe lines

You'll get maximum service from wire rope that has been specially designed for a special job. Over the years, ropes for all types of equipment in every field have been developed by Macwhyte. It will pay you to get Macwhyte Wire Rope that has been job-proved and engineered for your particular equipment. Recommendations are promptly available from Macwhyte distributors or Macwhyte Company.

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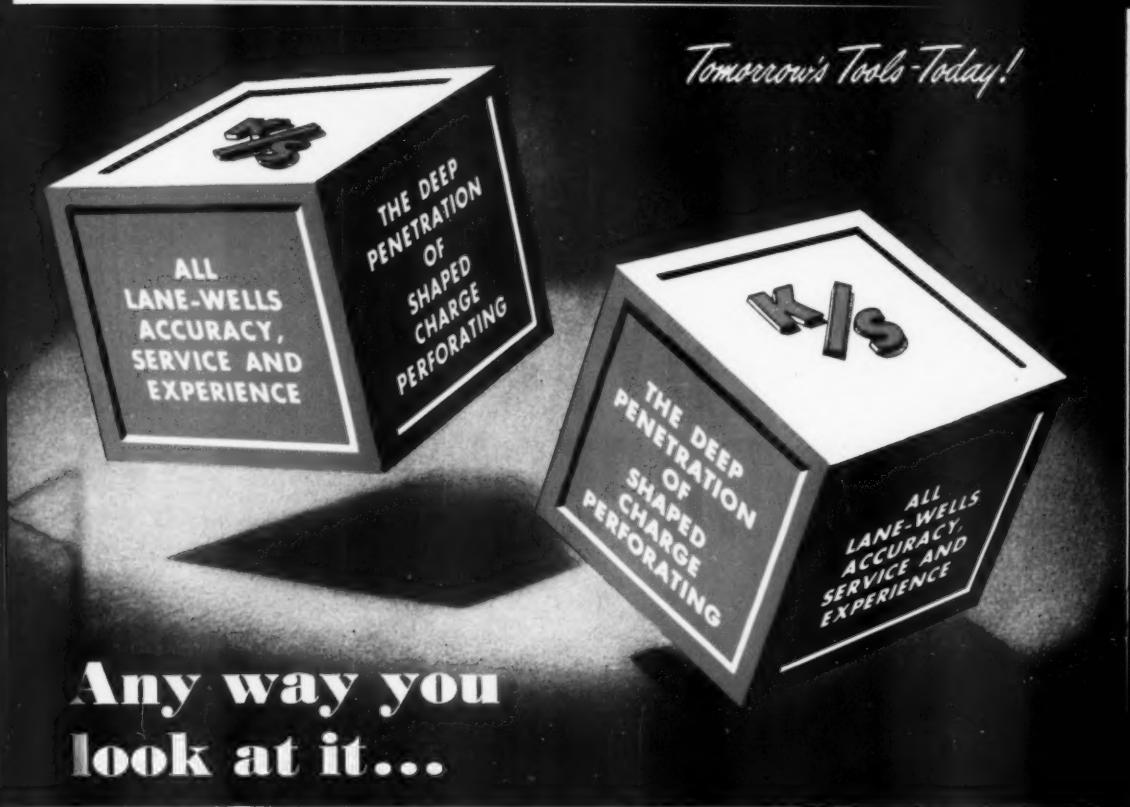
Tomorrow's Tools-Today!
ALL LANE-WELLS ACCURACY, SERVICE AND EXPERIENCE
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THE DEEP PENETRATION OF SHAPED CHARGE PERFORATING
ALL LANE-WELLS ACCURACY, SERVICE AND EXPERIENCE
Any way you look at it...

LANE-WELLS KONESHOT

is the "plus-value" perforating

"Deep penetration" is, to many operators, the one great thing about shaped-charge perforating. Okeh—you get it with Koneshot. But you also get Lane-Wells "plus-values" with the deep penetration . . measurement accuracy that hits depths on the nose and puts the shots where you order them; experience gained in 19 years of successful perforating jobs in every oil field in the county; trained crews who know your field and its particular conditions like the palms of their hands; up-to-the-minute equipment engineered for maximum effectiveness and maximum safety. These "plus-values" add a lot to any job.

And, if you're one of the many operators who use Lane-Wells service because of that experience and equipment—who place great value on Lane-Wells depth measurement accuracy and enviable safety record—then the deep penetration of Koneshot is a "plus-value" that can help a lot on your tough jobs. But, either way you look at it, you can't beat Koneshot for penetration, accuracy, and safety—and the "plus-values" cost you nothing extra.

Ask Your Lane-Wells Man!

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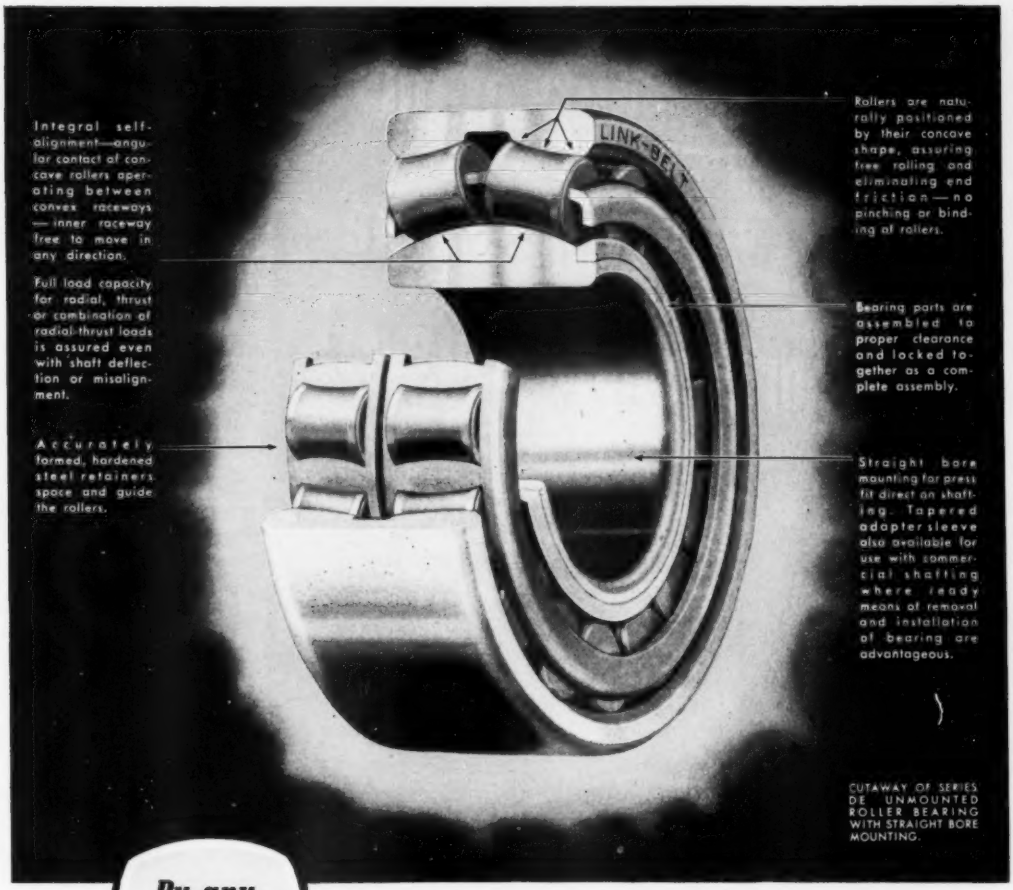
AK-411

LINK-BELT Ball and Roller Bearings smooth the path of power


Integral self-alignment—angular contact of concave rollers operating between convex raceways—inner raceway free to move in any direction.
Full load capacity for radial, thrust or combination of radial-thrust loads is assured even with shaft deflection or misalignment.
Accurately formed, hardened steel retainers space and guide the rollers.
Rollers are naturally positioned by their concave shape, assuring free rolling and eliminating end friction—no pinching or binding of rollers.
Bearing parts are assembled to proper clearance and locked together as a complete assembly.
Straight bore mounting for press fit direct on shafting. Tapered adapter sleeve also available for use with commercial shafting where ready means of removal and installation of bearing are advantageous.
LINK-BELT
CUTAWAY OF SERIES DE UNMOUNTED ROLLER BEARING WITH STRAIGHT BORE MOUNTING.

By any standard . . . **LINK-BELT Roller Bearings always assure anti-friction alignment**

Integral self-alignment of Link-Belt Unmounted Roller Bearings eliminates need for expensive, cumbersome self-aligning housings. Angular contact, concave rollers between convex raceways, provides capacity for thrust and radial loading. Preadjusted for clearance at the factory and packed to reach you in "final inspection" condition, they require no adjustment when you're ready for installation. There's a Link-Belt Bearing Specialist near you who can give you expert advice on *any* bearing application. You can also get all the facts from Data Book 2550.

LINK-BELT

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12,265

the adaptability of this BJ BILTON is more important now than ever!

SAVES SPACE

...close-coupled motor and pump are constructed in a single unit on a common shaft. No need for rigid foundation or base.

SIMPLIFIES INSTALLATION

...mounts in any position, at any angle, including wall mounting or sling mounting for portable use.

FEATURES INTERCHANGEABLE PARTS

...simplified construction uses fewer parts and allows easy interchangeability of all basic parts.

MINIMUM SPARE INVENTORY

...a small number of spare parts can serve a large number of working Biltons, providing full repair protection with a minimum inventory.

VERSATILE IN APPLICATION

...single-stage models meet all classes of low to medium head service. Two-stage models fill medium and medium-high head service.

The production problems to be met in the years ahead may demand a pump that can do more than one job ...a pump that can meet changing conditions of use...a pump that can be kept in service with a minimum of downtime. That's why now—more than ever—the adaptability of this Byron Jackson Bilton Pump has special importance to you. For more data on the Bilton or a BJ Job-Engineered Analysis of the model for your specific need, contact your local Byron Jackson sales office or write

AVAILABLE IN SPECIAL CONSTRUCTION

...BJ Mechanical Seal for handling liquids with special temperature, corrosion or pressure factors. Also explosion-proof motor, or other special construction.

LOW HORSEPOWER CONSUMPTION

...close-coupled construction allows more efficient application of power to pump.

Byron Jackson Co.

Since 1872

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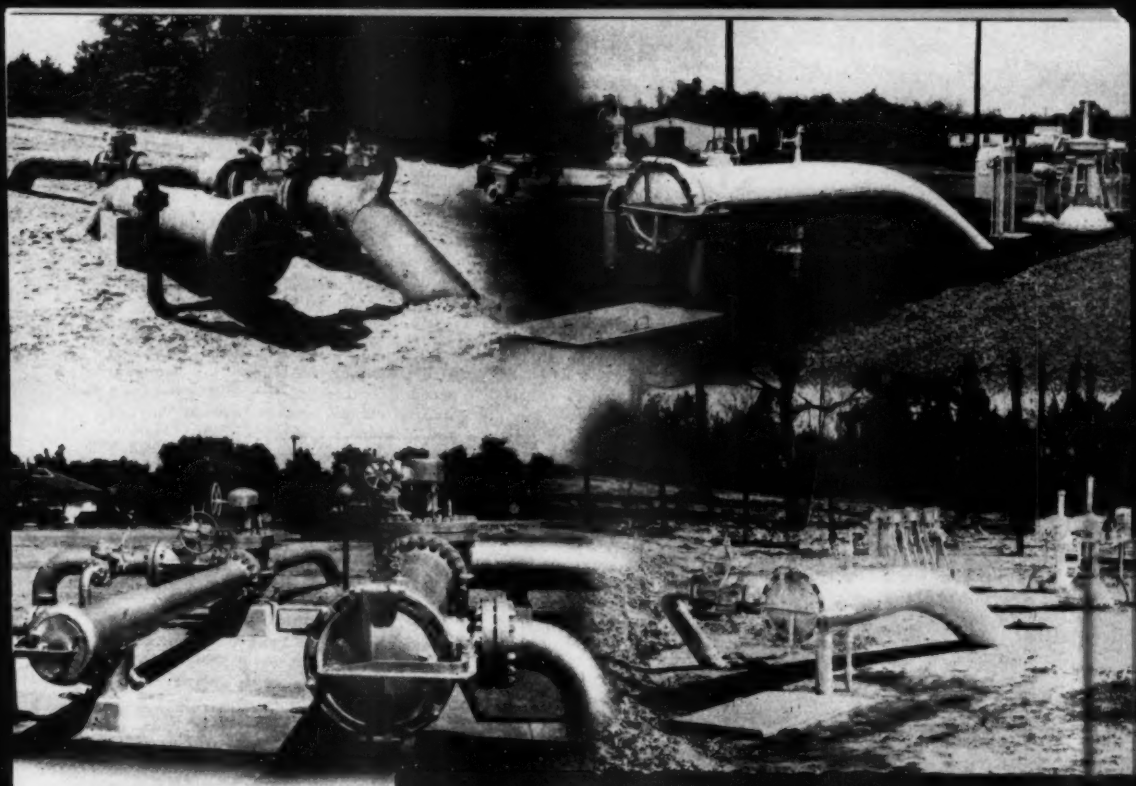
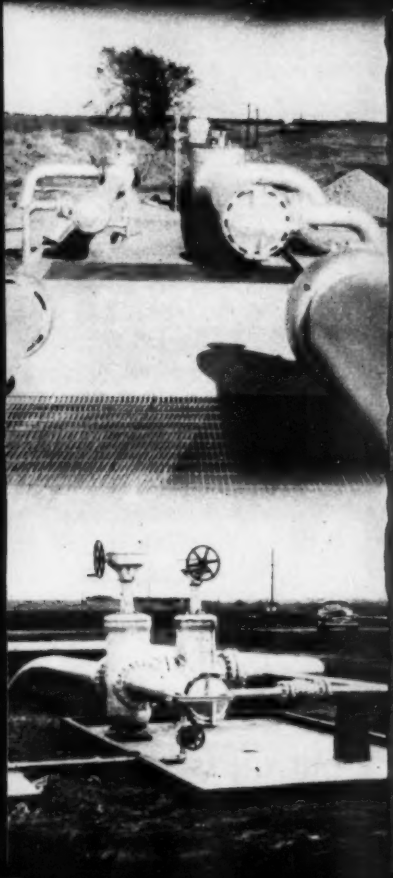
OFFICES IN PRINCIPAL CITIES

BJ BACKS YOU UP with Nation-wide service and a dependable parts source

WIDE CAPACITY RANGE

...Single-stage models in 1¼, 1½, 2, 2½, 3, 4 and 5 inch sizes. Two-stage in 1½" size. Capacities to 2000 gpm, heads to 475 ft.





THE EASY WAY TO CATCH A PIG!

UNIBOLT SCRAPER TRAP with oversize barrel

An oversize barrel on the sending and receiving ends of a line, slightly larger than the diameter of the pig, makes it easy to send or catch a pig. Line pressure does the heavy work. But to make the job doubly simple and easy, you need UNIBOLT Hinged Scraper Traps. To open them, all you need do is release two bolts and the blanking plug swings open like a door. No heavy lifting. Nothing to fall on workmen. No time-consuming blind flanges to break out and make up. No danger of leaks. A self-sealing resilient ring ensures a pressure-tight closure.

Wherever multi-bolt flanged couplings and closures are now being used . . . on strainers, scrubbers, mist removers, terminal manifolds, blowdowns or other pressure vessels . . . UNIBOLT Couplings will serve you better.

THORNHILL-CRAVER COMPANY [illegible] P. O. BOX 1184 • HOUSTON, TEXAS

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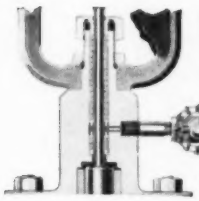
THIS FEATURE

OF THE HONEYWELL SERIES "700" VALVE



ONE-PIECE BONNET

One-Piece Bolted Bonnet of forged steel provides greater ruggedness, simplifies removal for maintenance. Stuffing box is an integral part of bonnet, depth at least six times diameter of stem. Lantern Gland is double packed (top and bottom) . . . added protection against leakage.

Specially Designed Neoprene Diaphragm

Duplex Upper Stem Guide

Packless Bellows Seal

Safety Stem Lubricator

Wide Variety of Discs

Reversibility in the Field

✻ Compare the bonnet of this valve with that of any other wide band proportional type. Look at it closely . . . study it feature by feature.

Then check the other features of the valve . . . the Specially Designed Diaphragm, the Duplex Stem Guide, the Packless Bellows Seal, the Safety Stem Lubricator, the wide variety of discs, the easy reversibility in the field.

Your comparison will prove that the Honeywell Series 700 has *all* the features you look for in a fine valve.

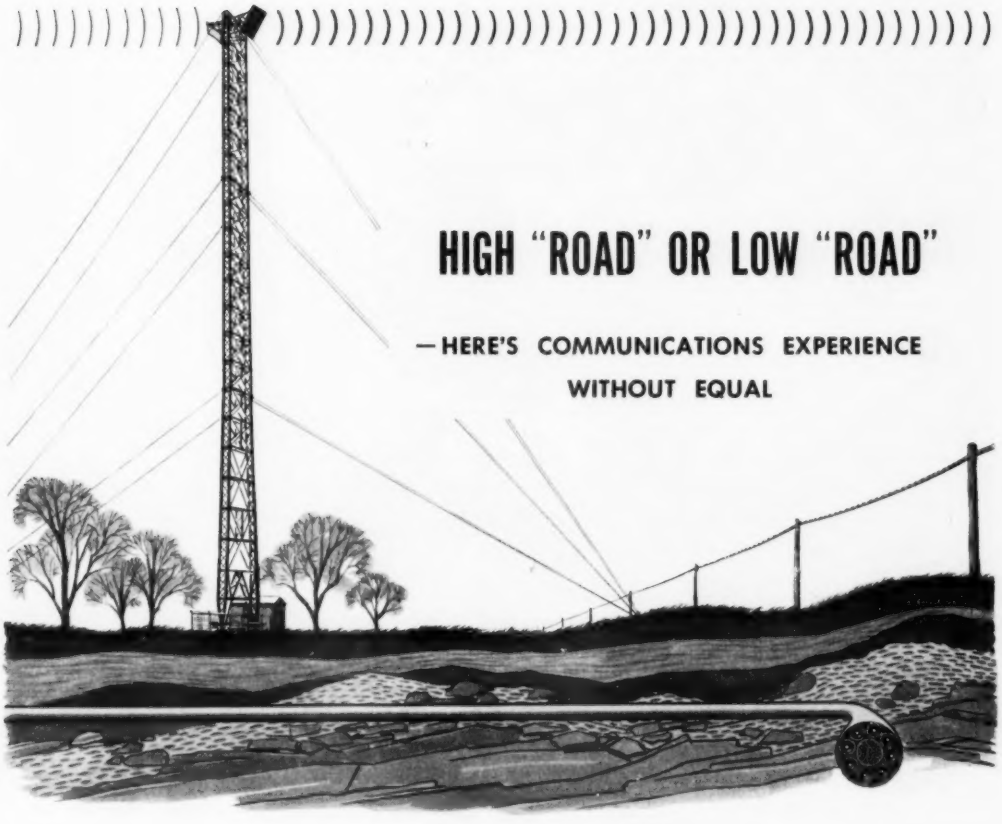
It's available in a wide range of styles and sizes. For detailed information, write for a copy of Catalog 700-2, or call in your local Honeywell engineer . . . he is as near as your phone.

MINNEAPOLIS-HONEYWELL REGULATOR CO., *Industrial Division*, **1906** Windrim Ave., Philadelphia 44, Pa. Offices in more than 80 principal cities of the United States, Canada and throughout the world.

New Bulletin 750, "Control Valve Sizing Data," is now available

MINNEAPOLIS **Honeywell**

Valve Products



HIGH "ROAD" OR LOW "ROAD"

—HERE'S COMMUNICATIONS EXPERIENCE WITHOUT EQUAL

MICROWAVE radio through the skies, wire and cable on poles, cable underground, the Bell System uses them *all* to furnish communications for the pipe-line industry.

With these high "roads" and low "roads," we provide a wide and flexible range of services. They include private-line telephone, mobile telephone, teletypewriter, and channels for facsimile, metering and remote station control.

You can measure our experience in delivering these services any way you wish—in miles, in years, in numbers of customers—and you'll find it unequalled anywhere. We're teaming this experience with that of pipe-line men to produce communications systems which best fit their needs.

•

Your Bell Telephone Company will be glad to study your communications problems and needs without charge.

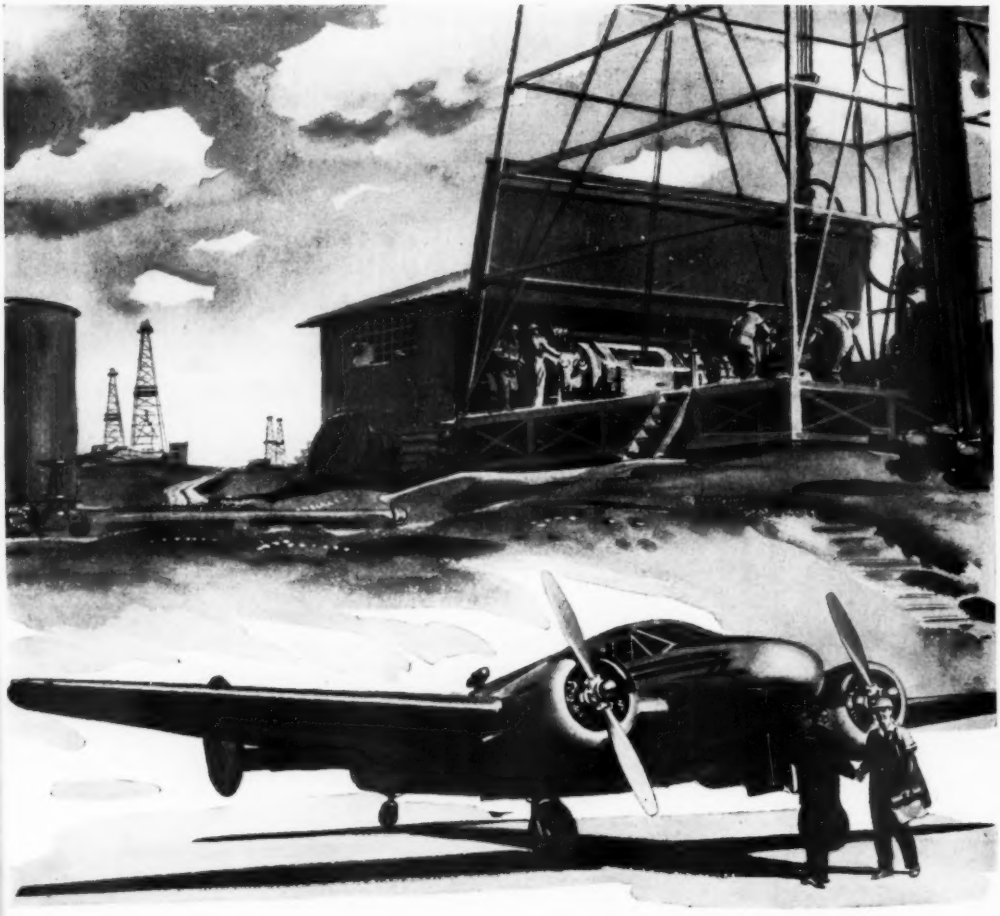
PRIVATE-LINE TELEPHONE

TELETYPEWRITER

MOBILE TELEPHONE

METERING CHANNELS

BELL TELEPHONE SYSTEM



HELPING AMERICA BUILD FASTER

Oil* and Beechcrafts make a profitable mixture!

Company-owned Beechcrafts slice travel time as much as 75% for key executives in over 200 companies in the petroleum industry. This twin-engine Beechcraft Executive Transport cruises at 200 miles per hour — puts oil fields right next to home offices.

***Beechcraft serves 'em all!** In every field of industrial activity, Beechcrafts are helping America build faster . . . helping America do the *double* job of increasing defense production and keeping consumer goods rolling, too. Learn how a Beechcraft can serve *your* business *profitably*. Call your Beechcraft distributor. Or write Beech Aircraft Corporation, Wichita, Kansas, U. S. A.

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HEADING: SW

Home-grown basic chemicals are one good reason for the growth of industry in the Southwest. Caustic soda, chlorine, sodium silicates—these are among the most essential chemicals for the production of crude oil, high-octane gas, hydrocarbons and a host of other products.

DIAMOND ALKALI has set its course Southwest to provide a nearby source of these and other chemicals. In gearing our plants, production and services to the needs of that region, we are growing with it.

DIAMOND SALES OFFICES: New York, Philadelphia, Pittsburgh, Cleveland, Cincinnati, Chicago, St. Louis, Memphis, Oklahoma City and Houston. Also representatives in principal cities.

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Carbon tetrachloride
Caustic soda
Chlorinated paraffins
Chlorine
Chromates
Muriatic acid
Precipitated calcium carbonates
Sodium silicates
Soda ash
Special chemicals

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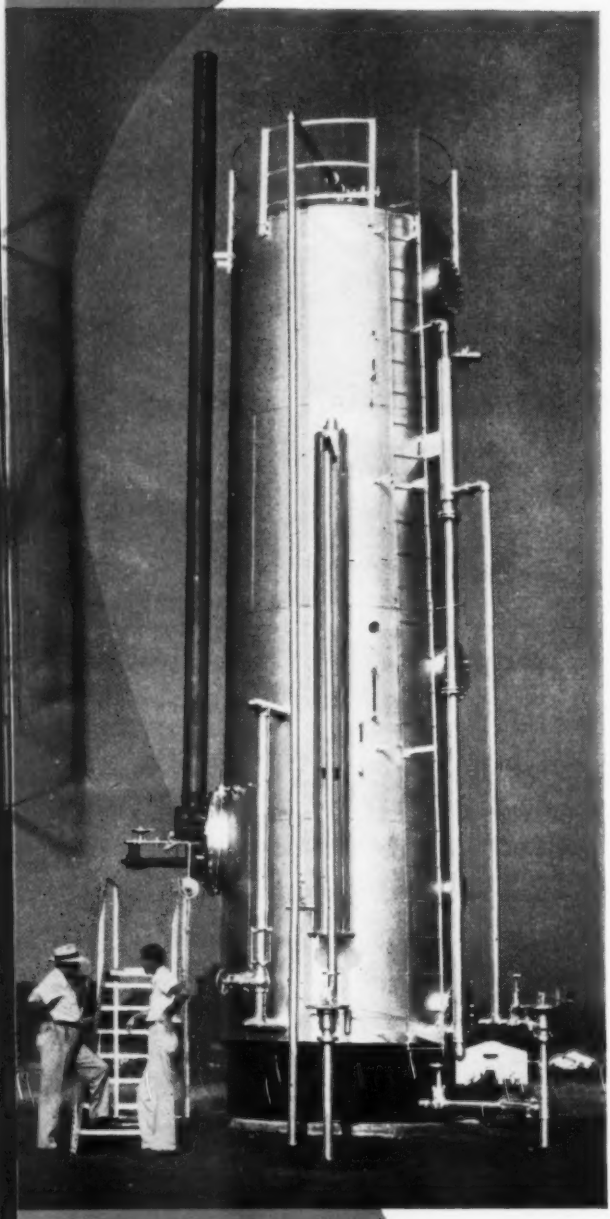
DIAMOND ALKALI CHEMICALS

"For EFFICIENCY, ECONOMY



I Like the

Says **BILL MARTIN,**
Production Supt.
for Roger Lacy, Inc.,
Longview, Texas

First to try the new BS&B Type "J" Treater in the Kilgore field, progressive Roger Lacy, Inc., leading independent producers in the East Texas-Louisiana area, have just installed two more Type "J" to handle emulsion conditions at Kilgore. The results obtained by the initial installation must have justified it!

Says straight-shooting Bill Martin, long-time production superintendent for Roger Lacy (*he's also a consistent medal-winning rifle marksman*)—"My job calls for production of high gravity oil at lowest cost per barrel. The Type "J", requiring less heat, does a better treating job; the Type "J's" simplicity of operation and ease of adjusting the water level means less maintenance cost. And BS&B's service department has certainly lived up to the slogan "Efficiency and Reliability." This all adds up to a lower-per-barrel production cost than we could get with cheap or less efficient equipment."

Foresighted Roger Lacy, Inc. has found it practical to install efficient, economical BS&B Type "J" Treaters to meet increasing salt-water conditions in the Kilgore field. By providing ample treating capacity, additional wells can be connected as they require treating. Lacy's Type "J" Treaters—two 8 ft. and one 10 ft.—are designed to handle the 18 Lacy wells in the immediate area.

SIMPLICITY and SERVICE...

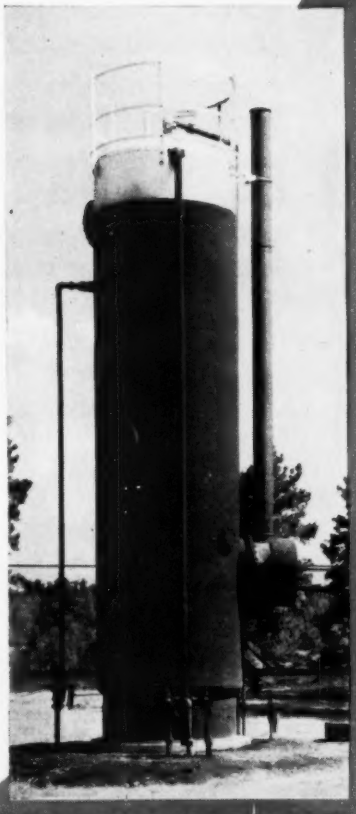
BS&B TYPE "J" TREATER"

Higher Gravity – Greater Capacity – Better Separation *Mean Lower Treating Cost Per Barrel with the New BS&B Type "J" Treater*

Like Roger Lacy, Inc., of Longview, Texas, other producers throughout the oil country are finding it profitable to handle treating problems with the new BS&B Type "J" Treater – doubly profitable because the exclusive Type "J" operating principles produce more and higher gravity oil at a lower cost per barrel.

Here's Why – The Exclusive Type "J" gas cycle minimizes gravity loss through "cold" initial gas-oil separation . . . larger capacity gas separating section . . . longer settling time in quiet, gas-free section . . . less heat in firebox by using heat of treated oil . . . single, more easily adjustable water siphon . . . efficient, removable, easy to clean firebox (without draining oil from treater) . . . highest water removal capacity through pre-heating of emulsion . . . lower fuel, operating and maintenance cost – and greater capacity, higher gravity of oil to tanks.

TYPE "J" TREATERS available in sizes and capacities to meet your treating requirements from 100 to 3,600 bbls. a day – 4′ x 28′ – 6′ x 28′ – 8′ x 28′ – 10′ x 28′.



BS&B TYPE "S" TREATER

Built for economical pressure operation on less difficult treating conditions. This So. Louisiana installation for a major oil company is *"Doing a 100% job at lower fuel cost"* according to the engineer in charge.

BS&B

Write Today for Your Free Copy of the BS&B Emulsion Treater Catalog

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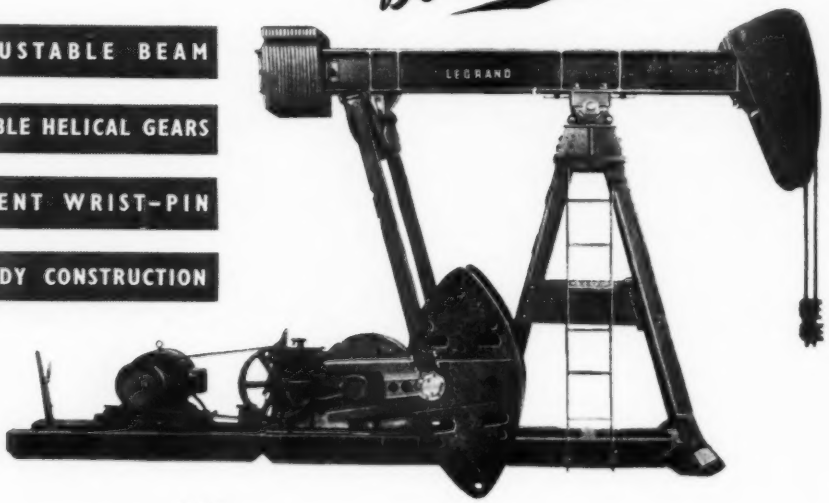
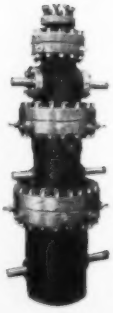
LE GRAND

PRECISION BUILT OILFIELD EQUIPMENT

Best in the Field

- ADJUSTABLE BEAM
- DOUBLE HELICAL GEARS
- PATENT WRIST-PIN
- STURDY CONSTRUCTION





Typical Le Grand O.C.T. casing head arrangement. The experience built into this equipment over the past 23 years results in economical and reliable field service.

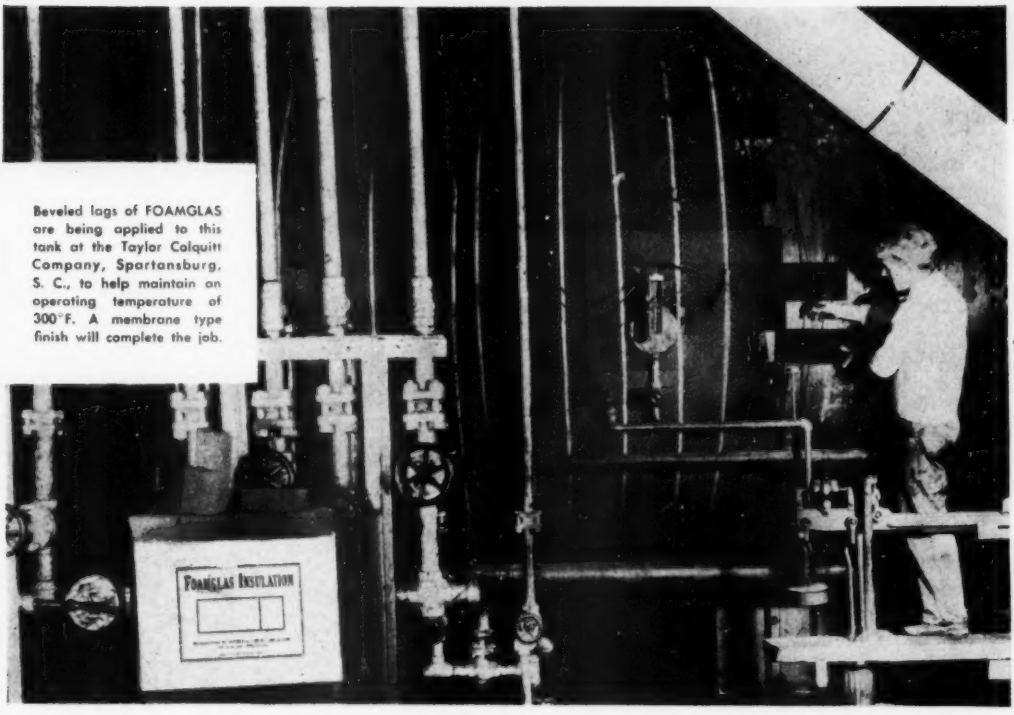
Le Grand Pumping Units, precision built after extensive research, embody modern refinements in design and construction ensuring a field efficiency that gives constant production with low maintenance costs under the exacting conditions experienced in the World's oilfields.

LE GRAND SUTCLIFF & GELL LTD

OILFIELD EQUIPMENT DIVISION

HORSTED AIRPORT, ROCHESTER, KENT, ENGLAND

Manufacturers of oilfield equipment including the products of Oil Center Tool Co., Houston, Texas, U.S.A. under licence



Beveled lags of FOAMGLAS are being applied to this tank at the Taylor Colquitt Company, Spartansburg, S. C., to help maintain an operating temperature of 300°F. A membrane type finish will complete the job.

KEEPING HOT STUFF HOT!

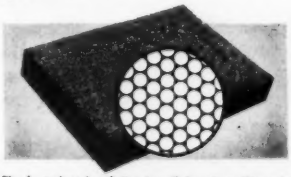
FOAMGLAS

the cellular glass insulation

This unique material has proved its ability to insulate tanks and towers, valves and piping, heat exchangers, evaporators and other processing equipment, most effectively and economically.

FOAMGLAS has excellent insulation properties and *retains* them, unchanged, year after year. It has unusually high resistance to moisture, chemicals, and other elements that cause most insulating materials to deteriorate. It assures freedom from costly repairs and replacements. Light weight, rigid and strong, FOAMGLAS is ideal for insulating indoor and outdoor, hot and cold piping and process equipment.

Start today to learn more about FOAMGLAS. Its wide acceptance is due to its basic insulating value, adaptability and durability that insures long, trouble free service. Send for a sample and a free copy of our latest booklet.



The *best* glass insulation is cellular glass. The *only* cellular glass insulation is FOAMGLAS. This unique material is composed of still air, sealed in minute glass cells. It is light weight, incombustible, vermin-proof. It has unusually high resistance to moisture, chemicals and many other elements that cause insulation to deteriorate.

PITTSBURGH CORNING CORPORATION
PITTSBURGH 22, PA.

PITTSBURGH PC CORNING ®

FOAMGLAS® *the cellular glass insulation*

When you insulate with FOAMGLAS — the insulation lasts.

Pittsburgh Corning Corporation
Dept. DD-121, 307 Fourth Ave.
Pittsburgh 22, Pa.

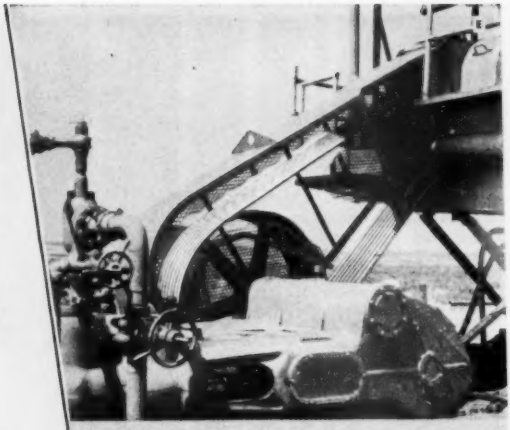
Please send me without obligation a sample of FOAMGLAS and your FREE booklet on the use of FOAMGLAS for Piping & Process Equipment.

Name.....

Address.....

City.....State.....

Prove for yourself why Gates Vulco Ropes are giving you longer V-Belt Wear!



The fastest well ever drilled in Scurry County, Texas—Texas Co. No. 154 P. L. Fuller—was completed by Parker Drilling Co. in 19 days, 8½ hours. Usual time required in this area is 30 days. Gates Vulco Ropes drove mud pump of the drilling rig.

There is a very simple reason why Gates Vulco Ropes—the V-belts built with *concave sides*—are giving you substantially *longer wear*—and you can easily prove this for yourself in just 2 minutes' time!

Pick up *any* V-belt whatever and bend it as it bends when going around a pulley. As the V-belt bends, grip its sides with your fingers—and here is what will happen, every time.

If the belt you are bending is a *straight-sided* V-belt, you can *feel* its sides *bulge out* as the belt bends. This out-bulge forces the sides of the belt to press *unevenly* against the V-pulley—as shown in figure 1-A (see accompanying diagrams).

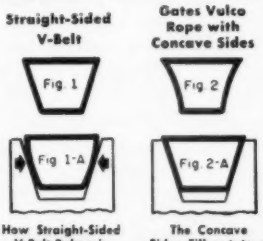
Clearly, this *uneven pressure* against the V-pulley causes the belt to wear *unevenly*—with the wear *concentrated* where the bulge is greatest—and this concentrated wear at one point naturally shortens the life of a *straight-sided* V-belt.

Now, make this same test with the belt that is built with Concave Sides—the Gates Vulco Rope!

Whereas you felt an *out-bulge* when you bent a belt with straight sides, you find that the *Concave Sides* merely fill out and become *perfectly straight*. The sides therefore *press evenly* against the V-Pulley. This distributes the wear *uniformly* across the *full width* of the belt. Naturally, this means longer belt life and *lower* belt costs for you!

Only V-Belts made by Gates are built with concave sides. Whenever you buy V-Belts, be sure that you get the V-Belt with the Concave Sides—The Gates Vulco Rope!

What Happens When a V-Belt Bends



How Straight-Sided V-Belt Bulges in Sheave -Groove. Sides Press Unevenly Against V-Pulley Causing Extra Wear At Point Shown by Arrows.

The Concave Sides Fill out to a Precise Fit in the Sheave Groove. No Side Bulge! Sides Press Evenly Against the V-Pulley—Uniform Wear—Longer Life!

CS-5110

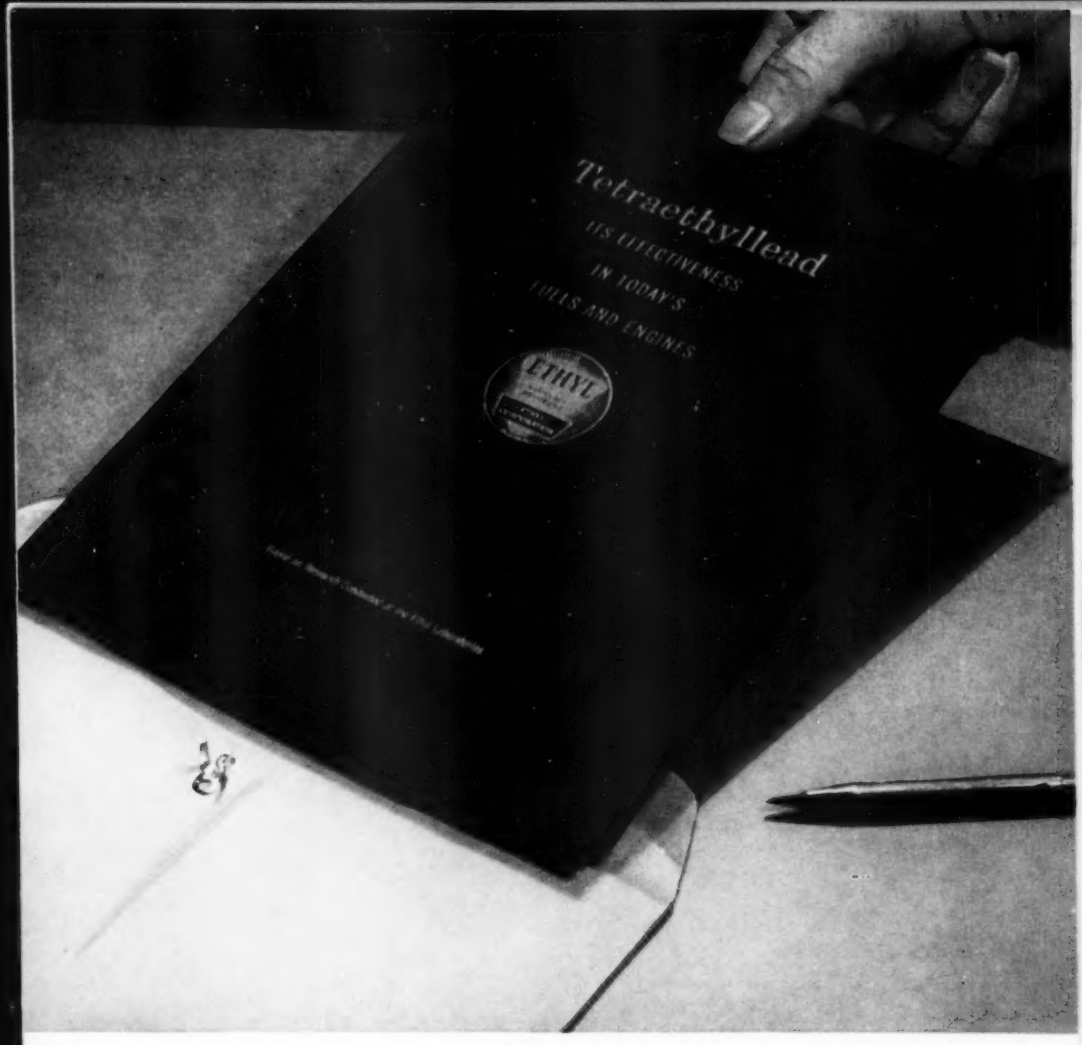
Gates® Hose V-Belts Molded Rubber Goods for Industry

VULCO ROPE DRIVES

ENGINEERING OFFICES AND JOBBER STOCKS IN ALL INDUSTRIAL CENTERS

THE GATES RUBBER COMPANY • DENVER • U•S•A

World's Largest Maker of V-Belts



It took twenty-eight years to write this book

Twenty-eight years ago the first antiknock compound containing tetraethyllead was marketed. At that time, the need for some means of suppressing knock was obvious.

But it is extremely unlikely that automotive and petroleum engineers wrestling with the problems of 1923 would have anticipated that the antiknock compound which solved so many of their difficulties then would prove to be even more valuable a quarter of a century later.

How could they possibly have known that tetraethyllead would become more effective as advances were made in the refining of gasoline? How could anyone have foreseen that leaded fuels of high octane number would show greater "sensitivity" than clear fuels of the same number—thus making tetraethyllead even more valuable as engine designers took advantage of this

(continued on next page)

ETHYL
ETHYL CORPORATION

It took twenty-eight years to write this book

(*continued from preceding page*)

increased "sensitivity"?

How could even the most progressive thinkers have anticipated a time when progress in the refining of gasolines and in the design of engines would be such that the third cc of tetraethyllead would allow as much increase in compression ratio as the first cc did in 1923? And there was certainly no hint of the part tetraethyllead might someday play as a suppressor of auto-ignition.

Only after years of observing and accurately measuring the effectiveness of tetraethyllead under a wide variety of conditions could facts such as these—and the reasons behind them—be clarified. Actually, within the covers of this book, there have been compressed the essential findings of twenty-eight years of intensive research.

We feel that the information contained in "Tetraethyllead—Its Effectiveness in Today's Fuels and Engines" will be of interest and value to you. If, by some chance, you have not received a copy, we will be pleased to send you one.

ETHYL CORPORATION
100 PARK AVENUE
NEW YORK 17, NEW YORK

Ethyl service is backed by 28 years of antiknock experience

FARM SERVICE

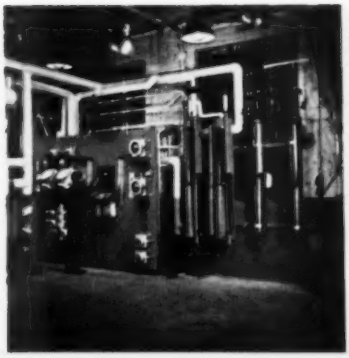
FUEL RESEARCH

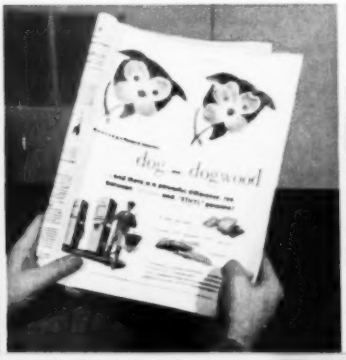
SUPPLY SERVICE

PREMIUM GASOLINE PROMOTION

SAFETY SERVICE

ROAD TESTING





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NO. 6056
Forged
Steel
Gate Valve

Here is a Premium Valve
that is NOT premium priced

CHECK THESE DESIRABLE FEATURES:

- Bolted bonnet construction
- Heat-treated and hard chrome plated stainless steel wedge
- Stainless steel gland eye-bolts and nuts
- Two-piece gland and follower
- Tongue and groove bonnet joint

It's well designed. It's low priced in its field.

See your R-P&C distributor or write nearest R-P&C district office.

ACCO

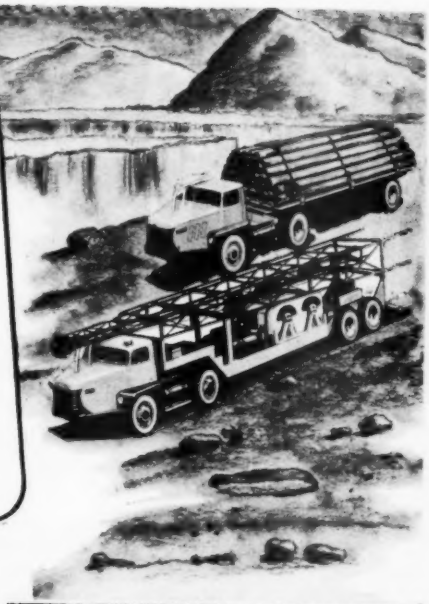
R-P & C VALVE DIVISION
AMERICAN CHAIN & CABLE

"Intentionally Better"
READING-PRATT & CADY VALVES

Get there Fast in toughest running conditions!

WALTER TRACTOR TRUCKS haul right to the site

No need for crawler tows
No need for special roads
No lost time or production



Every minute counts when you're rushing servicing equipment on an emergency call—or hauling expensive, heavy drilling equipment to location. Don't risk lost time and production because trucks bog down in bad weather and running conditions, or slow-moving crawlers delay arrival of equipment.

Haul with Walter Tractor Trucks! Keep loads moving fast, through mud, sand, uneven ground, snow, up steep grades. The Walter 4-Point Positive Drive provides four automatically powered driving wheels. Only the *working* wheels get the power, instead of wasting it on spinning wheels as in all other drives.

Write for Bulletin T-83 which gives complete engineering details of Walter Tractor Trucks. Or ask your distributor below.

WALTER MOTOR TRUCK CO.
1001-19 Irving Ave.
Ridgewood 27
Queens, L. I., N. Y.

In Canada:
Walter Motor Trucks of Canada Ltd.
46 Elgin St.
Ottawa, Ontario

Above: Walter Oilfield Tractor for speedy servicing, emergencies and exploratory trips. Compact, highly maneuverable, gets to locations formerly impossible for wheeled vehicles. Model shown has 16,000 lb. g.v.w. Larger models available.

Left: 240 h.p. Walter Tractor Truck for heavy duty trailer hauling of rigs, pipe and equipment. Hauls 40,000 to 50,000 lb. payloads . . . 70,000 to 80,000 lb. gross train weights, off the road or on the highway, within legal axle and width limitations.

WALTER
4-POINT POSITIVE DRIVE
TRACTOR TRUCKS
Haul where others stall

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CROUSE-HINDS

Hazardous areas in this plant are lighted by Crouse-Hinds EV Series Explosion-Proof and Raintight Lighting Fixtures

Explosion-Proof LIGHTING FIXTURES

. . . EXCEED the requirements for service in highly explosive atmospheres

To be safe for use in such locations, the fixture must operate at a temperature below the ignition temperature of the gas-air or vapor-air mixture. Also, the fixture must be so strong that it will resist internal explosions without damage and so tight that it will prevent the escape of flames or burning gases which might ignite the surrounding atmosphere.

Crouse-Hinds EV Series explosion-proof and raintight industrial lighting fixtures meet all of these requirements PLUS a wide margin of safety for extra protection.

Complete listings are in Crouse-Hinds Condulet Catalog.

Crouse-Hinds offers a complete line of explosion-proof and dust-tight lighting fixtures for use in hazar dous locations where fluorescent lamps are desired.

Type EVF 1, 2, 3, or 4-lamp

CROUSE-HINDS COMPANY
Syracuse 1, N. Y.

OFFICES Albuquerque—Birmingham—Boston—Buffalo—Chicago—Cincinnati—Cleveland Dallas—Denver—Detroit—Houston—Indianapolis—Kansas City—Los Angeles—Milwaukee Minneapolis—New York—Philadelphia—Pittsburgh—Portland, Ore.—San Francisco Seattle—St. Louis—Washington RESIDENT REPRESENTATIVES Albany Atlanta—Baltimore—Charlotte—New Orleans—Richmond, Va. Crouse-Hinds Company of Canada, Ltd., Toronto, Ont.

A Nationwide Distribution Through Electrical Wholesalers

CONDULETS • TRAFFIC SIGNALS • AIRPORT LIGHTING • FLOODLIGHTS

NEW

Specially Designed for Processing Operations

★ Choice of Materials
★ Oil Lubricated Bearings
★ Temperatures to 500° F.
★ Sizes to 1200 GPM, 250 Ft Head
★ Stuffing Box or Mechanical Seal

LONG LIFE, high efficiency, easy maintenance; you get them all from this new Allis-Chalmers Petroleum Pump. A wide choice of materials plus application engineering by men who know how to select the right material for your job means longest possible parts life and low maintenance costs no matter what you pump.

There is plenty of room between pump and pedestal for easy maintenance but rigidity has not been sacrificed. Maximum interchangeability of parts between sizes keeps parts inventory low.

ONE DEPENDABLE SOURCE

Allis-Chalmers can supply you with a complete pumping unit—pump, motor, drive and control — all of coordinated design and manufacture and all mounted on a rigid base ready to install.

To get more information on this new Allis-Chalmers Petroleum Pump, call your Allis-Chalmers Authorized Distributor or District Office. Or write to Allis-Chalmers, Milwaukee 1, Wis. for Bulletin 52B7638.

A-3459

Sold . . .
Applied . . .
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MOTORS — ½ to 25,000 hp and up. All types.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE — Belts in all sizes and sections, standard and *Vari-Pitch* sheaves, speed changers.

Texrope and *Vari-Pitch* are Allis-Chalmers trademarks.

ALLIS-CHALMERS

How to add machining capacity without adding machines

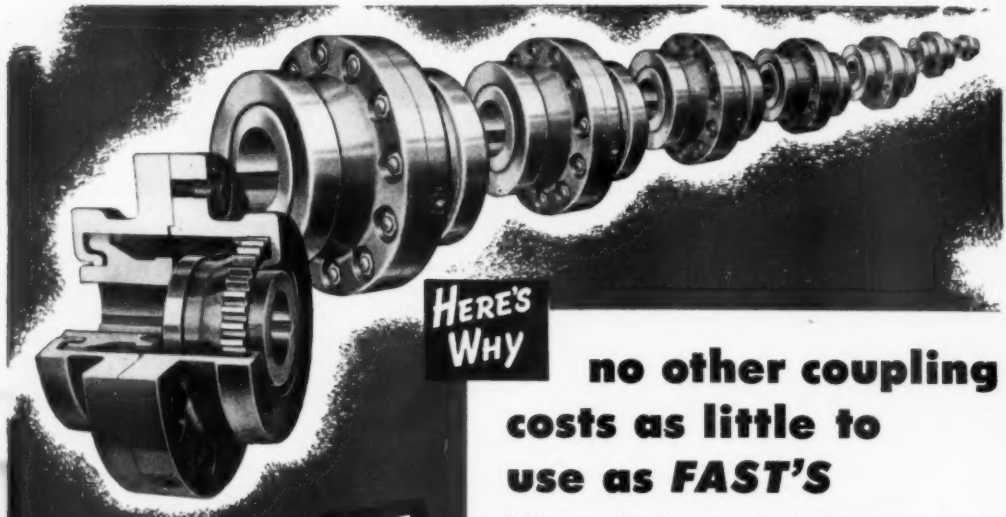
YOUR machine tools become more productive when you use Timken® seamless tubing instead of bar stock for hollow cylindrical parts. Timken tubing has the center hole already there. Drilling is eliminated. Finished boring is often your first production step. As a result, screw machine stations are released for other operations.

You save steel, too, by using seamless tubing. Since the hole is already there, there's less metal that has to be machined away. You get more parts per ton of steel. And to further assure savings in material, the Timken Company provides a tube engineering service which recommends the most economical tube size for your job—*guaranteed* to clean up.

All this and better quality too! Because the piercing process by which Timken seamless tubing is made is basically a forging operation, you have fine forged quality in your product—greater strength and toughness. And from tube to tube and heat to heat, this quality is always uniform. It's rigidly checked at every step in production. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

Specialists in alloy steel—including hot rolled and cold finished alloy steel bars—a complete range of stainless, graphitic and standard tool analyses—and alloy and stainless seamless steel tubing.



HERE'S WHY

no other coupling costs as little to use as FAST'S

With Fast's Couplings you get the lowest coupling cost per year that modern engineering can provide—*because Fast's normally outlast the equipment they connect.* That means their cost can be spread out over 20 years or more!

As two users recently said:

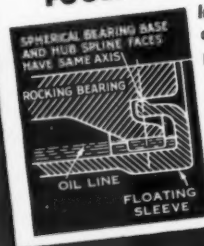
"We've had this Fast's Coupling since 1930 . . . and it's apparently going to last forever. [Wish] the other equipment caused as little trouble!" . . . "We have two Fast's Couplings . . . they are the only equipment so trouble-free we long ago forgot we had them!"

If you want lower costs, freedom from coupling shutdowns and dependable coupling engineering—specify Fast's. For complete details, mail the coupon for Fast's free catalog. Do it today!

RUGGED CONSTRUCTION:

Fast's still maintains its original design, without basic change or sacrifice in size or material. This assures you freedom from needless and expensive coupling failures.

FOOLPROOF DESIGN:



Instead of perishable oil seals, Fast's Couplings use a permanent metal-to-metal closure to keep dust out and oil in. Oil is always maintained at a safe level whether the Fast's is running or standing still.

FREE SERVICE:

When you specify Fast's Couplings you get Koppers' valuable free coupling service. If your application seems to need a special coupling, Koppers' engineers in many cases can easily modify a standard Fast's Coupling, and save you money!

MAIL COUPON TODAY FOR FREE CATALOG!

KOPPERS CO., INC., *Fast's Coupling Dept.*,
382 Scott St., Baltimore 3, Md.

Gentlemen: Send me Fast's Catalog which gives detailed descriptions, engineering drawings, capacity tables and photographs.

Name.....

Company.....

Address.....

City.....Zone.....State.....

KOPPERS

FAST'S

THE ORIGINAL GEAR-TYPE

Couplings

INDUSTRY'S STANDARD FOR 31 YEARS

"I was Sergeant Richard Murphy

with a supply squadron in the Tenth Air Force during World War II. Day after day, we saw planes loaded with more gasoline than my car now uses in a year. But we never ran out of gas."

That was true because, back home, the oil companies expanded their output of aviation gasoline fifteenfold. And most of it was a super-quality product, unknown a few years before.

During the war you never heard anyone say that some of the oil companies were "too big," and it's no more true today than it was then. The way things are going in the world, we can all be thankful that we have some big ones. National security requires them.

It takes a good many thousand separate oil companies —large and small—to serve America's needs. Through their efforts, petroleum has steadily become more useful and more widely used. It has probably had more to do with improving the daily life of the American people, during the past 50 years, than any other one thing.

Standard Oil Company (INDIANA)

FROM THE TANK WAGON days of 50 years ago, America has grown—and so has Standard Oil. We and our subsidiary companies have more than 46,000 employees, working together from the ground up to help meet your demand for quality petroleum products at economical prices. In 1899, ten years after we started business, the United States still had less than 76 million people, who used 57 million barrels of oil. In 1950, 151 million Americans used well over 2,000 million barrels of oil.

AS STANDARD OIL has grown, the number of our owners has grown. One of our 116,000 owners is Mrs. Isabel Ley of Grand Rapids, Michigan, who has been a Standard Oil stockholder for more than 20 years. Also among our owners are many educational institutions and charitable organizations, hundreds of insurance companies and business firms. No one person owns as much as 1% of our stock; no institutional owner has as much as 4%.

OUR CUSTOMERS have made us big. We have millions of customers, among them the Knutson family of Chicago, Illinois. All of them are free to buy from our competitors. But they buy our products because they like our quality, values, and service—and we hope, because they like us. We are working to hold our customers, seeking always to be big enough and good enough to serve them better and better.

why ALCO AIRCOOLERS are specified for these Installations

There's no mystery about the preference for performance-proved ALCO Aircoolers. These efficient units are used everywhere by the oil industry to cool jacket-water, gas, engine lube oils, and to condense steam, vapors, etc. Users prefer them because they have five major advantages:

1. LOW COST—Goes way beyond first cost. ALCO standardized parts . . . broad heat-transfer experience . . . volume production . . . plus correctly engineered safety factors . . . insure *real* economies.

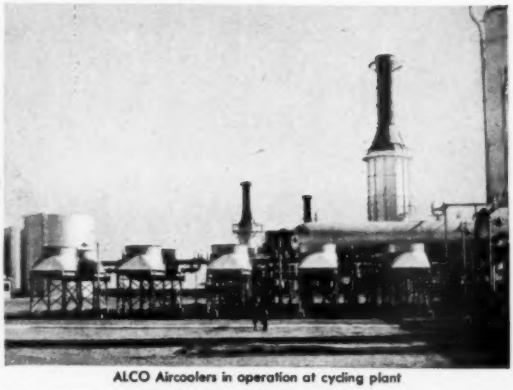
2. FLEXIBLE DESIGN—You can get either the radiator core or fintube type cooler from ALCO, powered by electricity, steam, gas or oil.

3. EFFICIENT PERFORMANCE—Induced draft design eliminates the chance of recycling hot air with a subsequent loss in heat transfer.

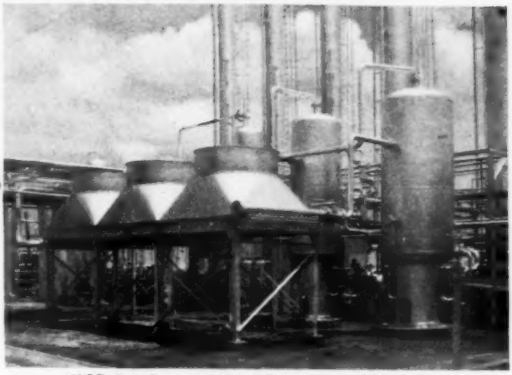
4. EASY MAINTENANCE—Fewer parts, easy accessibility and better wearing characteristics.

5. QUICK INSTALLATION—For fast field assembly, every part is marked and identified on assembly drawings so that no specialized labor is required.

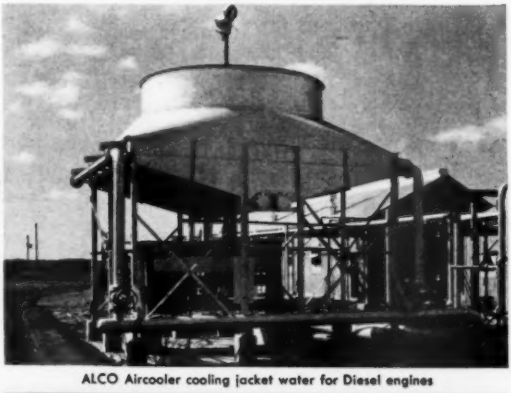
Send now for free catalog, or call your nearest ALCO Sales Engineer at Beaumont, Chicago, Houston, Los Angeles, New York or Tulsa. Plants at Dunkirk, New York, and Beaumont, Texas.



ALCO Aircoolers in operation at cycling plant



ALCO Aircoolers on treating columns in a natural gas plant



ALCO Aircooler cooling jacket water for Diesel engines

ALCO

ALCO Products Division

AMERICAN LOCOMOTIVE COMPANY

In step with tomorrow—ALCO AIRCOOLERS, Heat Exchangers, Evaporators, Feedwater Heaters, Pressure Vessels, Pipe

Old pipe reconditioned by cement mortar lining.

MAKE YOUR OLD PIPE LINE PERFORM LIKE NEW...

at much less than new pipe line costs!

FOR WATER, GAS AND OIL PIPE LINES OF 4" DIA. AND UP

Before reconditioning. After reconditioning.

- **Restore flow coefficients.**
- **Reduce pumping costs.**
- **Prevent leakage.**
- **Protect against corrosion.**
- **Protect against discoloration and contamination.**

Patented Cement Mortar Lining Processes Recondition Lines in Place

Are you encountering leaks, reduced flow capacity or other pipe line troubles due to failure in service of an old pipe line?

If so, reconditioning by the famous TATE and CENTRILINE processes can solve your problems quickly, efficiently and economically.

These processes use patented equipment that thoroughly removes all tuberculation and incrustation and applies a smooth, continuous cement mortar lining of proper thickness. All the work is done with the pipe line in place and with only momentary interruption of service to install by-pass lines.

The thoroughly reconditioned pipe gives practically new and permanent pipe line performance at much less than new pipe line costs. Write for complete details today.

PIPE LININGS, Inc.

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A subsidiary of

AMERICAN PIPE AND CONSTRUCTION CO.

P. O. Box 3428, Terminal Annex, Los Angeles 54, California

meet an **IMPORTANT** newcomer in the petroleum **PRESSURE MEASUREMENT** field!

the **BALDWIN SR-4** pressure cell

Here is a new method of measuring, controlling, or monitoring fluids and gases in the petroleum field, completely free of many hazards and inaccuracies of conventional devices.

In pressure measurement on pipe lines, these Baldwin SR-4 Pressure Cells can be placed at desired locations . . . and through electrical connections will report-in continuously to a remote central control point.

In depth gaging of storage tanks, the Baldwin SR-4 Pressure Cells will provide a continuous record of levels on indicating, recording, or alarm instruments.

In cracking or synthesizing plants, fractionating towers, and other refinery operations, Baldwin SR-4 Pressure Cells provide a positive means of checking and controlling pressures and safeguarding equipment.

In research operations, these Pressure Cells provide an unusually accurate means of measuring ultra-high pressures, surges, and explosion waves. There are no moving mechanical parts, so hysteresis and inertia effects are virtually abolished.

Heart of the Baldwin SR-4 Pressure Cell is a pressure-sensitive tube, with an SR-4 Strain Gage bonded to it. Tube material can be varied to meet a wide variety of corrosive and pressure conditions. Size is only 2″ x 7½″; capacities 200, 500, 1000 and 20,000 psi. (On an experimental basis, a 50,000 psi unit is available.) Also available is a low-range series (not illustrated) with standard capacities of 10, 20, 50 and 100 psi.

Write for Bulletin 306. It describes the principle and construction of the device . . . your own ingenuity will undoubtedly suggest places where it can solve some problem for you.

BALDWIN BLH LIMA-HAMILTON

BALDWIN-LIMA-HAMILTON

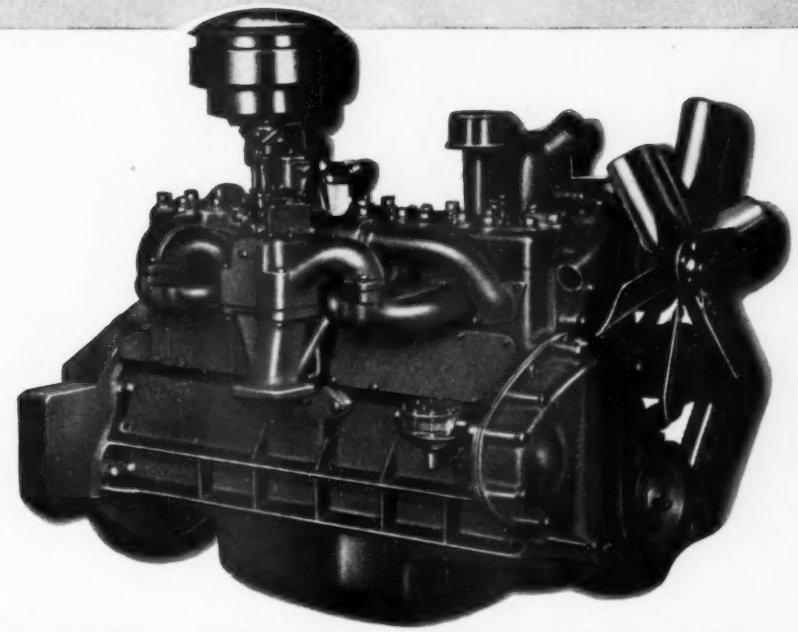
TESTING HEADQUARTERS

EDDYSTONE DIVISION, BALDWIN-LIMA-HAMILTON CORPORATION, PHILADELPHIA 42, PA.

In Canada: Peacock Bros., Ltd., Montreal, Quebec

LET'S FACE FACTS

about Industrial Engines



CHRYSLER HAS LOWER FIRST COST

Chrysler quantity production methods have been adapted to specialized industrial engine building. As a result, you get a custom-built engine at mass-production price levels. A Chrysler engine *costs less than many other engines*, yet it's still a special engine *designed* and *engineered* for a special job.

CHRYSLER HAS LOWER MAINTENANCE COSTS

Simplified, clean construction makes *field repair easier, faster, less expensive.* Famous Chrysler engineering achievements like Superfinished Wear Surfaces, dynamically balanced shafts and Chrysler-developed steels and alloys produce parts less subject to wear *—more hours of uninterrupted service.*

CHRYSLER HAS SMOOTHER OPERATION

Because Chrysler Industrial Engines are high speed, high compression engines, they offer *smooth running power under extreme loads.* Scientifically designed combustion chambers extract the maximum power from fuels. No stalling. No bucking. No killing the engine. *Full power range is instantly available.*

CHRYSLER HAS PARTS AND SERVICE AVAILABILITY

Chrysler will keep you operating with a minimum of downtime. *Chrysler Parts and Service are always available!* Again quantity production and standardization keeps strategically located depots and Chrysler Industrial Engine Dealers supplied with complete stocks of parts for immediate delivery.

See your local Chrysler Industrial Engine Dealer, or write:
Industrial Engine Division, Chrysler Corporation, Detroit 31, Michigan.

CHRYSLER
Industrial Engines and Power Units

HORSEPOWER WITH A PEDIGREE

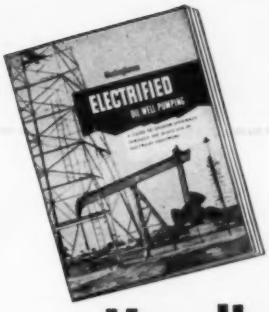
YOU CAN BE **SURE**.. IF IT'S

Westinghouse

Here's a sample page. The whole book is chock-full of useful, specific engineering information.

Westinghouse

EQUIPMENT FOR THE PETROLEUM INDUSTRY



Here's a New Helpful Handbook on Electrified Pumping

When you pump wells electrically, you make big savings. Are you getting your share? If not, this new 48-page book can help you make the long-range decisions that will affect the future economic course of your operations. If you're pumping with electricity now, you'll get factual engineering data that can boost your efficiency and sharpen up operating practice.

PROBLEM SOLVER

This book is heavy on facts. Authoritative information helps you answer such questions as: What size motors should I specify, which type? How about automatic time control? What's the best distribution system for my lease? How much transformer capacity do I need? What about lightning protection? —and a hundred others. You get information for detailed analyses now, have it assembled in a handy place for reference later on.

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1. Sure starting and high efficiency regardless of the weather or age of equipment.
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3. Less manpower on the lease. Sure time-clock operation with no human attention.
4. Lower maintenance cost—less inspection, fewer wearing parts.
5. Low installation costs—only a minimum foundation required, no house needed for weatherproof motor and controls.
6. Trouble-free operation at low temperatures; no fuel storage problems.

Write for your copy now

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Please send me, without charge, "Electrified Oil Well Pumping," B-4039.

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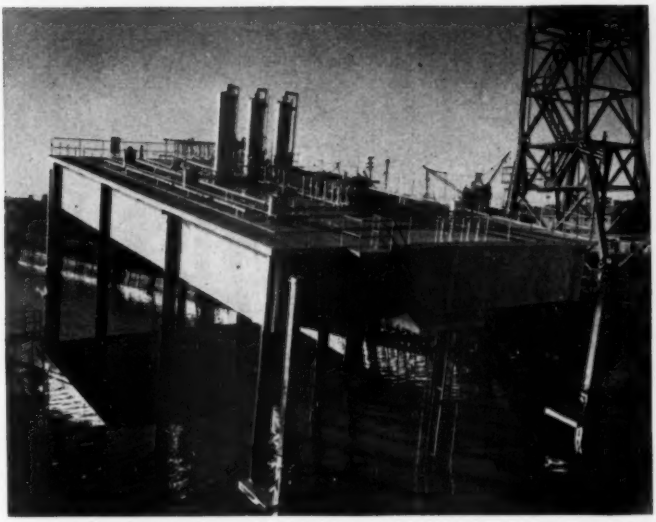
keep this page handy for future reference when you want **PB** OIL FIELD SERVICE

First Again

Bethlehem, which developed for the oil industry the *first* integrated submersible drilling barge and the *first* submersible compressor barge, now introduces the *first* submersible oil tank battery barge.



Constructed by Bethlehem's Beaumont Yard, this submersible tank battery barge can store 4,800 bbls of crude in its 72 ft x 48 ft x 8 ft superstructure. Part of the 80 ft x 52 ft x 5 ft float is submerged in this view.

NOW...Bethlehem's Submersible Oil Tank Battery Barge

For the Most Economical and Efficient Interim Storage of Crude in Shallow Water or Marshland

- Storage Capacity to Suit Your Requirements.
- Complete with Pumps, Oil and Gas Separators and Compressors.
- Eliminates Need for Costly Erection Crews Miles from their Base.
- No Piling to Pull or Cut when Moved.
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- Leakproof . . . Solves Pollution Problem.

Our engineers will be happy to supply further details on request.

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are authorized to design and construct Fluid Hydroforming Units. This process employs the "fluid" principle so widely and successfully used in Catalytic Cracking to obtain a high yield of high-octane gasoline with low first cost.

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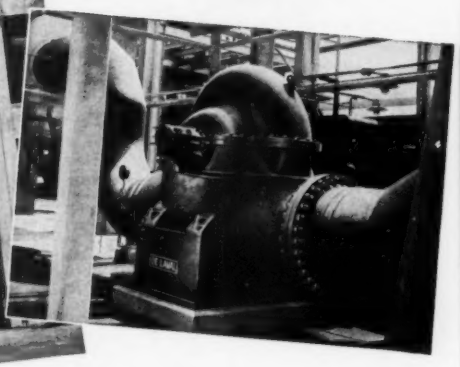
Headquarters: McKee Building, 2300 Chester Avenue, Cleveland 1, Ohio. *New York Office:* 30 Rockefeller Plaza, New York 20, N.Y. • *Washington Office:* 1507 M Street, N. W. Washington, D. C. • *England:* The Iron and Steel Division of Arthur G. McKee & Company is represented by Head, Wrightson & Company, Ltd. *District Engineering Offices:* Union, New Jersey and Tulsa, Oklahoma.

DeLaval Centrifugal Blowers

go on-stream in

first new design HOUDRIFLOW PLANT



New Bulletin NO. 0500 fully describes top-performance, maintenance-saving features of De Laval blowers *plus* data that make it virtually an engineering handbook on compression of gases and pipe friction. We have a new bulletin (No. 4215) on our high pressure mechanical drive turbines. Ask for a copy of it also.

ANOTHER DE LAVAL FIRST *

LOCATION: California Refining Company, Perth Amboy, N. J.

PROCESS: Houdriflow catalytic cracking.

ENGINEERED BY: C. F. Braun & Co.

DE LAVAL EQUIPMENT: Two 38,750 cfm single-stage, double-suction blowers, each driven by a De Laval "MCP" single-stage, high back pressure turbine. Operating conditions are 600 psi, 750F, 150 psi back pressure.

FUNCTION: Blowers discharge air at pressures to 5.3 psig for regeneration of the spent catalyst.

* De Laval "firsts" in blowers and compressors date as far back as 1902.

50th Anniversary

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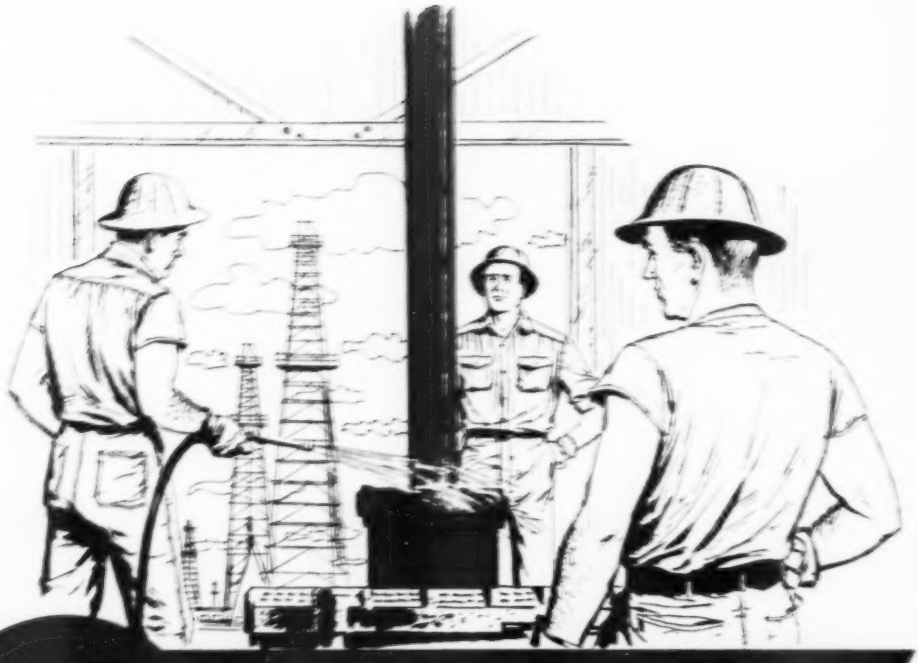

IDEAL kellys and collars are designed for smooth drilling

National Supply takes every precaution to assure that the IDEAL Kellys and IDEAL Drill Collars used in your drilling string will be as perfectly balanced as possible.

This careful attention to balance in IDEAL Kellys and Collars provides

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Protect your investment in rig and well with the best of drill string equipment . . . IDEAL Hexagonal Kellys, IDEAL Square Kellys, and IDEAL Drill Collars.

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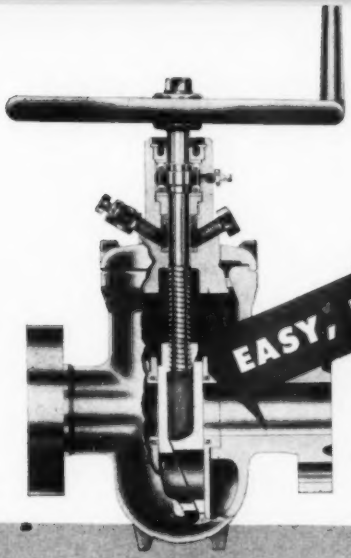
NATIONAL OIL FIELD MACHINERY AND EQUIPMENT • SPANG STEEL PIPE • SUPERIOR & ATLAS ENGINES

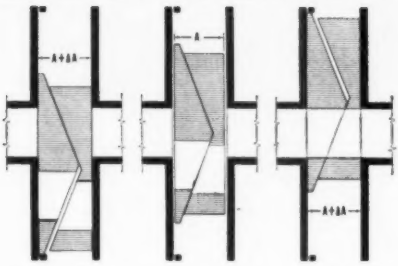


EASY, POSITIVE SHUT-OFF HERE..

MEANS SURE, SAFE CONTROL HERE!

W-K-M Parallel Expanding Gate provides a pressure-tight seal, open and closed — permits free-running operation under full-rated pressure.

Double-thrust Roller Bearings, ground stem threads, superfinished stem where it passes through the packing, contribute to the easy operation of W-K-M valves.



In closed position, the gate (left) and segment (right) seal tightly against both seats.

When opening or closing, the gate and segment are in neutral position, permitting free upward or downward movement of the gate assembly.

When open, the gate and segment again seal tightly against both seats and the bore of each lines up perfectly to provide a smooth, turbulence-free passage.

For the greatest safety, greatest operating reliability, oil men the world over specify W-K-M valves for their Christmas trees. The basic design of W-K-M valves (illustrated at left) provides a sure, tight seal in opened and closed positions and free-running operation while opening or closing.

Oil men specify W-K-M, too, because of its large and competent field organization qualified to render field emergency service and assist W-K-M valve users in any valve problem. W-K-M valves may be serviced and even completely overhauled without removing them from the Christmas tree.

Specify W-K-M for the surest and safest well control — for W-K-M valves are by far the most economical in the long run. 80% of the world's high pressure wells are controlled by W-K-M valves.

All W-K-M Valves Have

Through-Conduit Fluid Passage • Parallel Expanding Gate Assembly • Oversize Replaceable Seats Pressure Seal Bonnet • Double Row Thrust Bearings on Stem • Internal Lubrication

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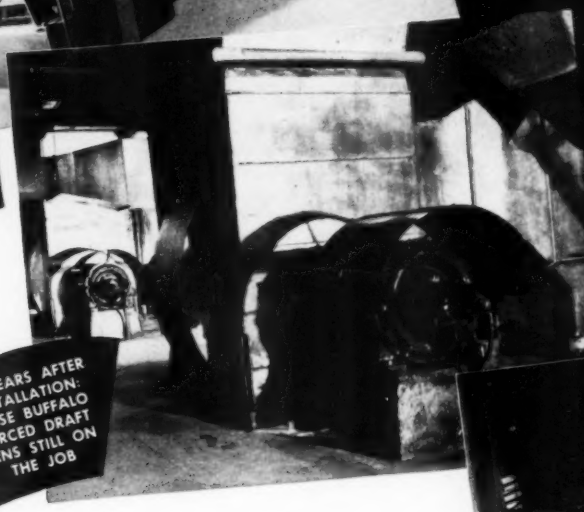
W-K-M Valves

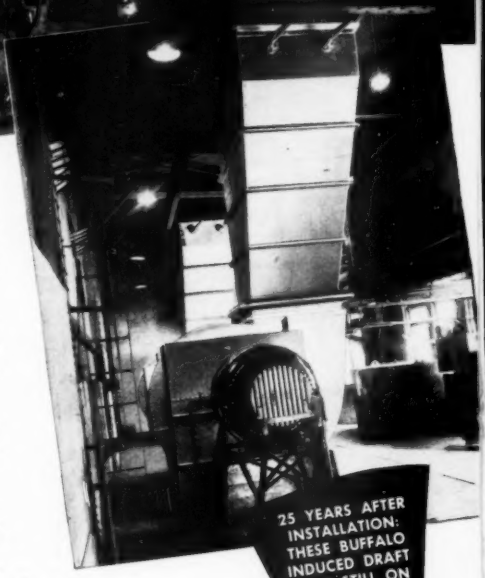
OILFIELD • PIPE LINE • PROCESS VALVES

25-YEAR-OLD "Buffalo" DRAFT FAN PROVE THE ECONOMY of DURABILITY

25 YEARS AFTER INSTALLATION: THESE BUFFALO PRIMARY FANS STILL ON THE JOB



25 YEARS AFTER INSTALLATION: THESE BUFFALO FORCED DRAFT FANS STILL ON THE JOB



25 YEARS AFTER INSTALLATION: THESE BUFFALO INDUCED DRAFT FANS STILL ON THE JOB

Wherever steam is produced for energy, you find a key industry. In every key industry you find "Buffalo" Mechanical Draft Fans represented—and doing a reliable job of keeping boiler combustion efficient.

In the Public Utility companies, where above all, power production must be continuous, "Buffalo" Draft Fans are proving that they can be relied on for remarkably long service periods.

The 24 "Buffalo" Draft Fans at Miami Fort Station, Cincinnati Gas & Electric Company, illustrate this durability. They are still in service after 25 years on industry's toughest fan job.

If you want the draft economy that comes only from rugged fan construction in the right places, specify "Buffalo." WRITE FOR BULLETIN 3750 for all engineering details.

"Buffalo" FIRST FOR FANS

BUFFALO FORGE COMPANY

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VENTILATING FORCED DRAFT | AIR WASHING COOLING | AIR TEMPERING HEATING | INDUCED DRAFT EXHAUSTING PRESSURE BLOWING

Mountain-climbing pipe line being laid for keeps!

IT'S PROTECTED BY BITUMASTIC ENAMEL!

THE 26-INCH natural gas pipe line, shown here, was laid across the most mountainous part of West Virginia for the Atlantic Seaboard Corporation. Here's a sample of what the pipe liners were up against: at one point the face of Cave Mountain rose at an average rate of 45 degrees, climbing for 1,700 feet before easing off to a more gradual slope.

When pipe lines are laid under such back-breaking conditions, they *must* go down to stay . . . they *must* be fully protected against corrosion. That's why this pipe line was coated with Bitumastic® 70-B Enamel.

Bitumastic® Enamels have established remarkable records in preventing corrosion — under the most severe corrosive conditions . . . in all types of soil . . . under wide variations of temperature. Thanks to these durable enamels, many gas and oil pipe lines, laid 20 and 30 years ago, are still giving good service today.

Specify Bitumastic Enamels and make certain *your* pipe-line projects get the most effective protection against corrosion. Your Koppers representative will give you complete details and estimates.

Bitumastic Enamels soon available from Koppers new California Plant!

As soon as present construction work is completed, Koppers will be able to supply Bitumastic Enamels from a new plant at Fontana, California. The plant is being built to give you better service in the West.

KOPPERS BITUMASTIC ENAMELS

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DISTRICT OFFICES: BOSTON, CHICAGO, LOS ANGELES, NEW YORK, PITTSBURGH AND WOODWARD, ALABAMA

Dependable

The most dependable device yet developed for pumping an oil well is a CABOT Unit powered with a Fairbanks-Morse "ZC" Engine or a Century Electric Motor.

Type T10UY—11DC Cabot Unit with a "ZC" 208 Fairbanks-Morse engine. This unit is designed to handle wells approximately 3200 feet deep. Engine is rated at maximum 10 H. P.

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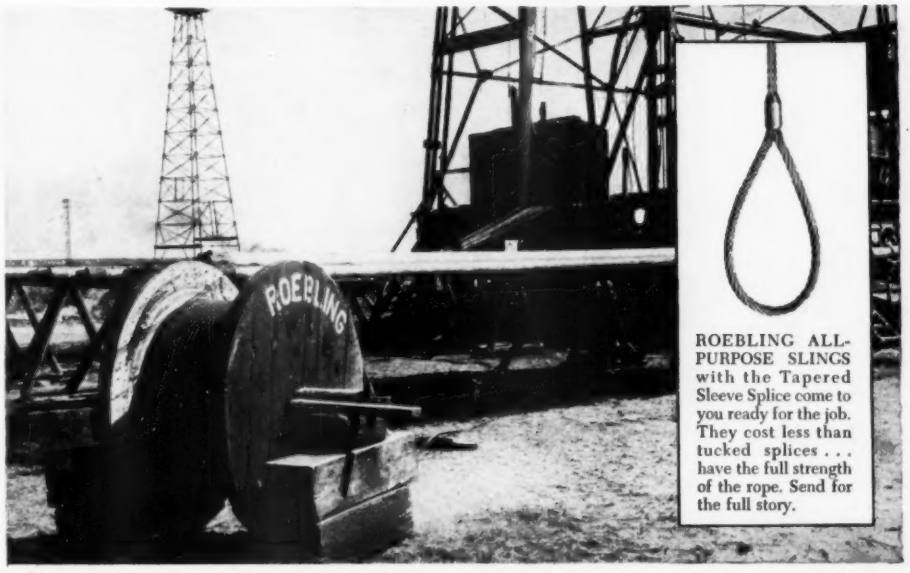
WIRE ROPE

You'll get more efficient, economical service with ROEBLING rope

TIME AND DOLLAR SAVINGS are more important than ever in the oil fields. One sure way to save time and cut costs is to specify Roebling Preformed "Blue Center" Steel Wire Rope. Here's a tough rope that stands up under shocks, strains and high speeds. Its preforming assures maximum handling ease, better spooling and smooth performance.

Roebling makes a full line of wire rope. Have your Roebling Field Man recommend the *right* ropes for your requirements. And for longest life on the job, get his advice on the correct use and maintenance of wire rope. It is based on experience with thousands of installations. John A. Roebling's Sons Company, Trenton 2, New Jersey.



ROEBLING ALL-PURPOSE SLINGS with the Tapered Sleeve Splice come to you ready for the job. They cost less than tucked splices . . . have the full strength of the rope. Send for the full story.

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greater

EFFICIENCY on Wilson atlas rigs

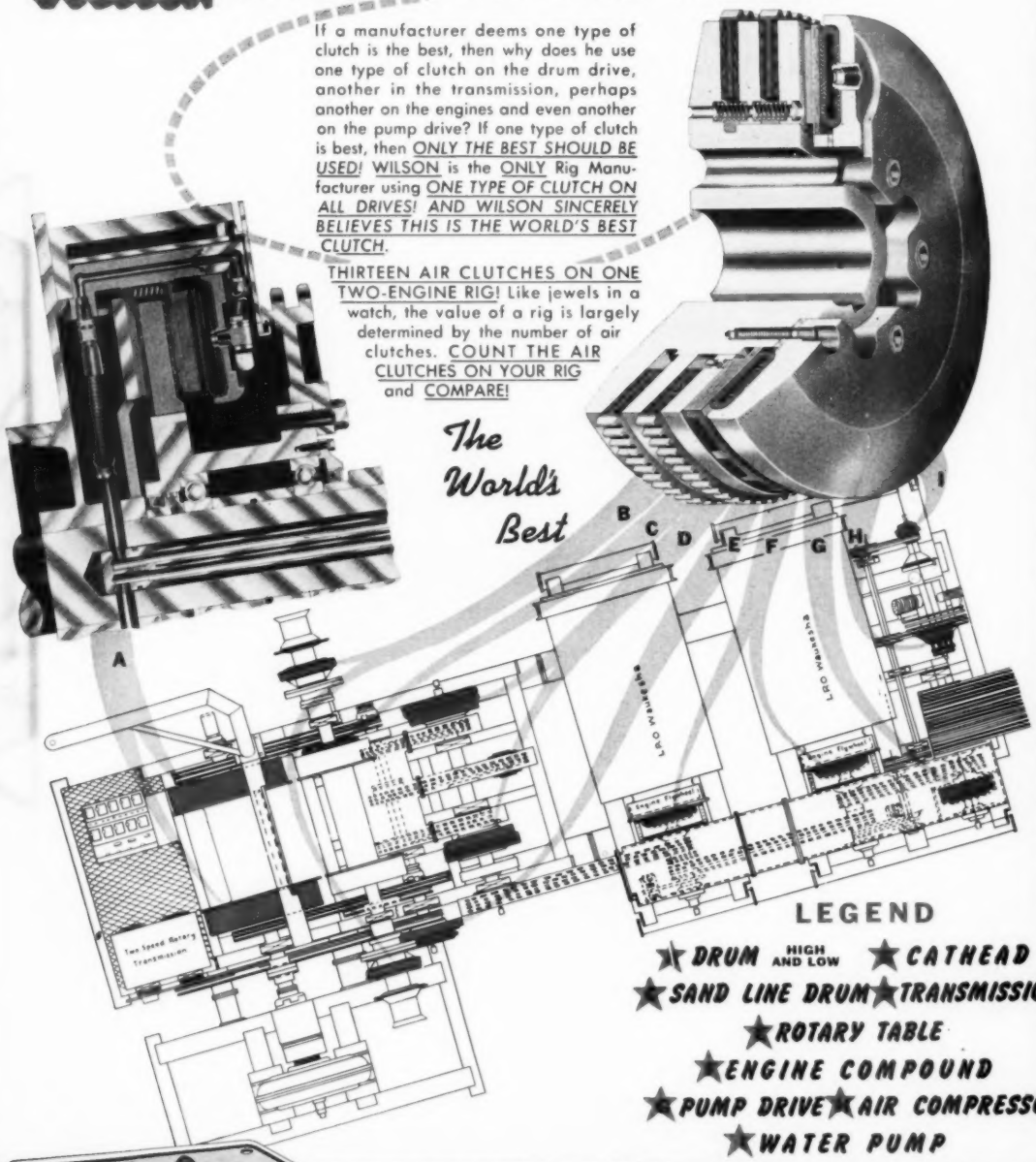
with WICHITA Air-Tube disc clutches

Wilson Air-Tube disc drum clutches

If a manufacturer deems one type of clutch is the best, then why does he use one type of clutch on the drum drive, another in the transmission, perhaps another on the engines and even another on the pump drive? If one type of clutch is best, then ONLY THE BEST SHOULD BE USED! WILSON is the ONLY Rig Manufacturer using ONE TYPE OF CLUTCH ON ALL DRIVES! AND WILSON SINCERELY BELIEVES THIS IS THE WORLD'S BEST CLUTCH.

THIRTEEN AIR CLUTCHES ON ONE TWO-ENGINE RIG! Like jewels in a watch, the value of a rig is largely determined by the number of air clutches. COUNT THE AIR CLUTCHES ON YOUR RIG and COMPARE!

The World's Best



LEGEND

- DRUM HIGH AND LOW
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- TRANSMISSION
- ROTARY TABLE
- ENGINE COMPOUND
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- AIR COMPRESSOR
- WATER PUMP

Wilson

MANUFACTURING CO., Inc.

WICHITA FALLS, TEXAS

They Say—

Middle East Comparison

"The importance of Iran, Saudi Arabia, Kuwait, and Iraq, whose proved reserves constitute 46.6 per cent of the estimated world reserves, is obvious when contrasted with 29 per cent for the United States. The present proved oil reserves in Saudi Arabia, Kuwait, and Qatar are the result of drilling fewer than 200 wildcat wells. More than 20 times that number are drilled each year in the United States."

Adam K. Stricker, Jr., General Motors Corp., addressing the American Society of Mechanical Engineers, Atlantic City.

Synthetic Extravagance

"If industry were not hard-pressed for materials and labor a case might be made out for Secretary Chapman's (synthetic fuels) cause.

"As it is, the country's oil wells and refineries are meeting all demands despite the paralysis of the Iranian plant. Because of governmental restriction the oil companies are finding it difficult to expand their facilities and produce not only the oil and fuels that we need but the thousands of chemicals that are based on oil and natural gas.

"If Secretary Chapman thinks we need more oil wells and more refineries and chemical works he could hardly do better than to give the oil industry the steel and other materials that it wants.

"The expenditure of even $100,000,000 in the manner that he advocates would be an unwarranted waste of capital, labor and materials. If our case were desperate we should do better to extract gasoline from shale oil at a cost of 16.2 cents a gallon, but even this expenditure would be an extravagance at a time when there is plenty of oil but a dearth of steel and other materials."

Editorial in the New York Times.

Transportation Horse Sense

"Much of the agitation for more regulation appears to be inspired by carriers who apparently wish to equalize the competitive ability of the various media.

"This is a dangerous path. Mankind cannot have the benefit of the most efficient use of facilities when artificial restraints are imposed to equalize competition. We never would have had the motor vehicle if its progress had been regulated according to its effect on the blacksmith, the harness maker, and the horse breeder.

"If the pipe line, the barge, the

"Quit cussing about pipe repairs and replacements —and DO SOMETHING!

install corrosion resistant SARAN LINED steel pipe

Right now is the time to act! Cut pipe repairs and replacements! Specify corrosion-resistant saran lined steel pipe! You'll find, as have many of the country's leading manufacturers, that this remarkable pipe means dependable long term operation at a minimum maintenance cost. Saran's unusual resistance to most chemicals and solvents plays an important part in the reduction of shutdowns due to pipe repairs and replacements. Another noteworthy advantage is its ease of field fabrication involving NO costly delays with special tools or handling.

These advantages are all important to you, so "quit cussing and do something." For detailed information mail this coupon to the Saran Lined Pipe Co. *Saran lined steel pipe is manufactured by The Dow Chemical Company.*

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tanker, and the tank truck had been under the thumb of government, we could not have developed our efficient and economical transport.

"Within an oil company various media of transportation are regarded as complementary. You don't see, for example, pipe lines and barges regarded as inherently entitled to an equal footing, and the proponents of each fighting each other. Instead, there is understanding and acceptance of the fact that each is supreme in its field and the smart thing is to use each accordingly.

"If the opposite direction is taken, the public will get stung. When one form of transport is used for a movement that another form could do more economically, the public pays the bill in one way or another."

B. Brewster Jennings, president, Socony-Vacuum Oil Co., Inc., addressing the National Industrial Traffic League, Chicago.

Leases by Lottery

"I feel quite sure that both industry and the private citizens view with alarm the precedent of developing potential public wealth by drawing numbers out of a hat.

"If that is to be the practice of the Department of the Interior, then all oil men must fall in line. In one sense it may save the oil companies some operating cost. Instead of well-educated scouts and geologists, they can just send their office boy over to the scene of the drawing.

"If this policy meets with public sanction, then the return of the tidelands to the State of Texas will be opposed by most people. For I am quite sure that for all time the State of Texas will continue to lease its lands by sealed bids and open auctions rather than by drawings which are lotteries in every sense of the word. A lottery at $10 per ticket for oil land worth millions, while advantageous to the lucky drawers, is not in the best interest of the people."

Bascom Giles, Texas land commissioner, on the New Mexico drawing for public-lands oil leases.

Cut Down on Oil

"We must not endanger the future of our country by unwise policies which would lead to the rapid exhaustion of those fuels of which we have only limited reserves."

Charles W. Connor, solid-fuels administrator, urging a halt to increasing oil and gas consumption before the Illinois Mining Institute, Springfield.

Industry Confidence

"No major industry has a closer or smoother working arrangement with the federal defense administrators than the oil and gas industry. Last week Interior Secretary Oscar Chap-

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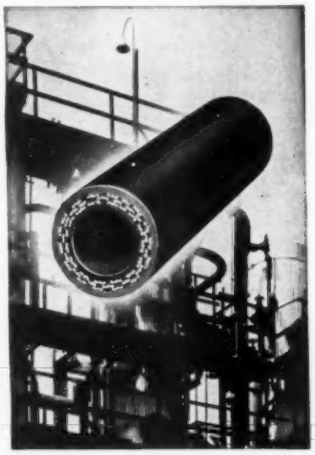
The tough cover protects Maltese Cross from oil film, acid fumes and chemicals . . . stops water absorption into the carcass . . . prevents mildew and eliminates need for drying-out after use. Inside is a mildew-inhibited, closely woven duck carcass that provides unusual durability and burst-resistance. Yet Maltese Cross is light, flexible, easy to coil, folds closely.

Fifteen years of active fire-fighting service, plus many more as a utility or clean-up hose, are what you can expect —*and get*—when you play it safe with Maltese Cross.

Monarch® Fiberglas* Steam Hose



Monarch is built to carry saturated steam at temperatures up to 388° F. and pressures up to 200 lbs. . . . and do it day in and day out without failure. The tube is an exclusive Hewitt-Robins development—a special heat-resisting compound that stays soft and flexible without flaking or cracking.

The carcass is multiple-braided Fiberglas cord—unsurpassed for heat resistance and strength—and heavily insulated with heat-resistant rubber. The cover is extra-tough, extra-thick, won't strip or blister . . . highly resistant to heat, abrasion and weather.

For general steam services in the oil industry — insist on Monarch Fiberglas Steam Hose!

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For these and many other specialized oil industry hoses, call your Hewitt Rubber Distributor (listed under "Rubber Products" in the classified 'phone book), or write Hewitt Rubber Division, 240 Kensington Avenue, Buffalo 5, New York.

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man demonstrated just how close the relation is. He came out flatly against a renewed effort to force a government man on the National Petroleum Council as chairman.

"The council is now the only industry advisory committee to any defense agency that has an industry man at its head (W. S. S. Rodgers, chairman of The Texas Co.). To get a Justice Department exemption from the general rule Chapman himself had to carry the case to the White House.

"The fight was reopened recently by the House Judiciary Committee. To the committee's report complaining about the situation, Chapman retorted: 'I like the council, respect its work, and will fight to the finish any new attempt to change its setup.'"

Business Week.

CALENDAR

December

American Association for the Advancement of Science, annual meeting, Philadelphia, December 27-28.

1952 Meetings

January

Society of Automotive Engineers, annual meeting, Hotel Book-Cadillac, Detroit, January 14-18.

February

American Society for Testing Materials, Committee D-2 on petroleum products and lubricants, Shoreham Hotel, Washington, D. C., February 3-8.

Missouri Petroleum Association, annual convention and trade exhibit, Jefferson Hotel, St. Louis, February 4-6.

Instrument Society of America, New York Section, power-plant symposium, Hotel Statler, New York City, February 7-8.

American Petroleum Institute, Division of Marketing, lubrication-committee meeting, Hotel Book-Cadillac, Detroit, February 18-19.

Wisconsin Petroleum Association, twenty-sixth annual convention and equipment show, Milwaukee Auditorium, Milwaukee, February 26-27.

American Association of Petroleum Geologists, Rocky Mountain Section, annual meeting, Salt Lake City, February 28-29.

March

American Society for Testing Materials, spring meeting, Hotel Statler, Cleveland, March 3-7.

American Petroleum Institute, Division of Production, southwestern district, Washington-Youree Hotel, Shreveport, March 5-7.

National Association of Corrosion Engineers, eighth annual conference and exhibition, Galvez Hotel, Galveston, Tex., March 10-14.

American Institute of Chemical Engineers, regional meeting, Atlanta, March 16-19.

American Petroleum Institute, Division of Production, Mid-Continent district meeting, Broadview Hotel, Wichita, Kans., March 21.

American Association of Petroleum Geologists, Society of Economic Paleontologists and Mineralogists, and Society of Exploration Geophysicists, joint annual meeting, Biltmore Hotel, Los Angeles, March 23-27.

Western Petroleum Refiners Association, annual meeting, Plaza Hotel, San Antonio, March 31-April 2.

April

American Petroleum Institute, Division of Production, eastern district, Hotel William Penn, Pittsburgh, April 2-4.

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FWD's give me more productive hours on the job
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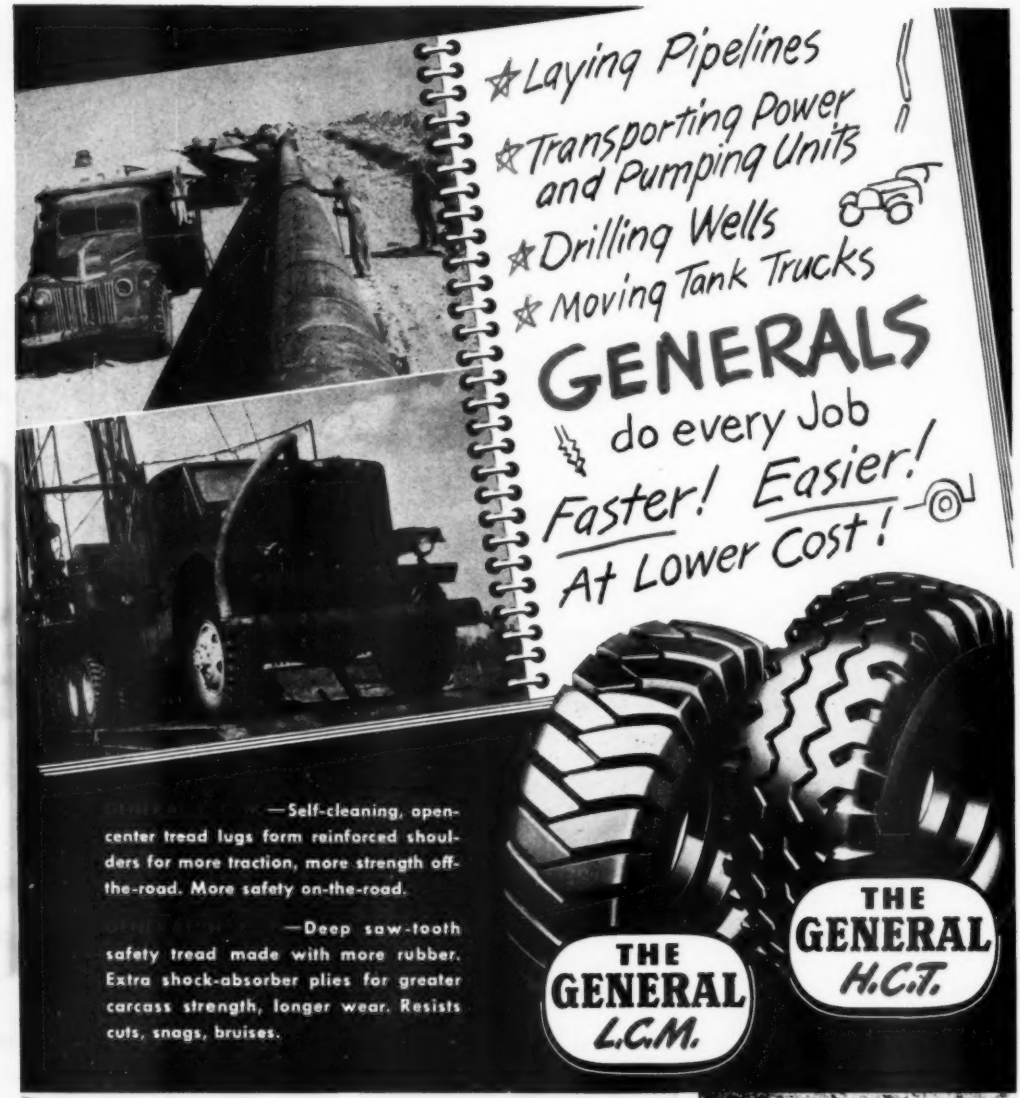
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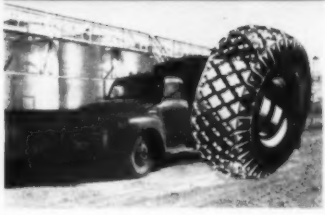

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GENERAL INDUSTRIAL PNEUMATICS — Wide-base small tires for extra cushioning, more flotation. Extra protection for equipment.

SPECIFY GENERAL TIRES ON YOUR NEW EQUIPMENT

Southwestern Gas Measurement Short Course, University of Oklahoma, Norman, April 8-10.

American Institute of Electrical Engineers, District 7 meeting, Hotel Jefferson, St. Louis, April 15-17.

American Petroleum Institute, Division of Transportation, pipe-line conference, Blackstone Hotel, Fort Worth, April 21-23.

American Petroleum Institute, Division of Production, Rocky Mountain district, Gladstone Hotel, Casper, Wyo., April 24-25.

Southern Gas Association, annual convention, Galveston, Tex., April 28-30.

Society of Exploration Geophysicists, Gulf Coast regional meeting, Rice Hotel, Houston, May 29-30.

American Institute of Electrical Engineers, District 1 meeting, Binghampton, N. Y., April 30-May 2.

Natural Gasoline Association of America, annual meeting, Rice Hotel, Houston, April 30-May 3.

May

American Geophysical Union, thirty-third annual meeting, National Academy of Sciences, National Research Council, Washington, D. C., May 5-7.

American Institute of Chemical Engineers, regional meeting, French Lick, Ind., May 11-14.

American Association of Petroleum Geologists, regional meeting, Mayo Hotel, Tulsa, May 12-13.

American Gas Association, Natural Gas Department, spring meeting, Biltmore Hotel, Los Angeles, May 12-13.

American Petroleum Institute, Division of Refining, seventeenth midyear meeting, San Francisco, May 12-15.

American Petroleum Institute, Division of Production, Pacific Coast district, Biltmore Hotel, Los Angeles, May 15-16.

American Petroleum Institute, Division of Marketing, midyear meeting, Copley Plaza Hotel, Boston, May 19-20.

Gas Appliance Manufacturers Association, annual meeting, Broadmoor Hotel, Colorado Springs, Colo., May 21-23.

American Gas Association, production and chemical conference, Hotel New Yorker, New York, May 26-28.

June

Pennsylvania Grade Crude Oil Association, annual meeting, Hotel William Penn, Pittsburgh, June 5-6.

Canadian Gas Association, Chateau Frontenac, Quebec, June 8-12.

American Petroleum Institute, midyear standardization meeting, Brown Palace Hotel, Denver, June 9-14.

Petroleum Equipment Suppliers Association, Mark Hopkins Hotel, San Francisco, June 22-25.

American Society for Testing Materials, annual meeting, Hotel Statler, New York, June 23-27.

American Institute of Electrical Engineers, summer general meeting, Hotel Statler, New York City, June 23-27.

September

American Institute of Chemical Engineers, regional meeting, Palmer House, Chicago, September 11-13.

American Association of Oilwell Drilling Contractors, annual meeting, Skirvin Hotel, Oklahoma City, September 28-30.

NOMADS

Tulsa Nomads, third Friday of each month. After Five Room, Tulsa Hotel.

Dallas-Fort Worth Nomads, first Monday of each month, Greater Dallas Club.

Houston Nomads, second Monday of each month, Ye Ole College Inn, Houston.

Los Angeles Nomads, second Wednesday of each month, Jonathan Club.

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HIT HARD

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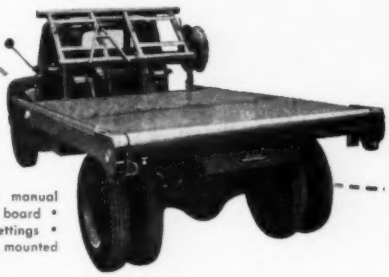
Gone are the days when a man could "baby" his machine. Today's construction crews must be able to throw the power in and get the job out! Leland's many nationally known construction equipment lines have made the "long haul"—gained recognition the hard way by continuous service, constant improvement, and the ability to dish out satisfactory work and soak up punishment. The Leland service is geared to help speed the job on its way. And don't forget the "Packaged Unit" . . . Leland's oil field truck body. On the yard or in the field, this "work horse" unit is easily adapted to fit any requirement . . . fill any need. When the job is tough and time is short—join with others who consistently call on Leland Equipment Company.



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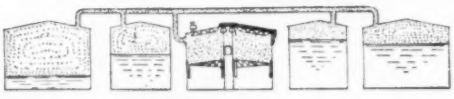
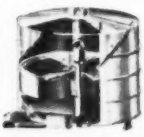
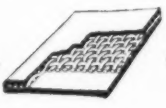
tanks were hooked up  with a

Wiggins DRY SEAL Gasholder.  Including expenses,

amortization took less than 20 months. What's more,

the Wiggins 100% DRY SEAL  cuts out rain

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JOURNALLY Speaking

He Turned the Trick

THE Secretary of the Interior has ruled that offshore oil lands cannot be bought from the Government with the land scrip which was issued to discharged soldiers years ago in an effort to get them to homestead in the then new West. That decision has been well publicized in our favorite oil publication and elsewhere.

What the news accounts didn't mention is that this scrip is what started the so-called tidelands mess in the first place.

It was back in the early days of the New Deal when Harold L. Ickes (remember him?) was Secretary of the Interior. A couple of bright guys quietly rounded up a bushel basket of land scrip. Lord knows where they got it; probably in old attics and curio shops, because the stuff had been out of use for a generation or two. But they collected enough to entitle them to purchase at $1 or so per acre a considerable portion of the underwater oil fields off southern California. Then they applied to the General Land Office for this area, claiming that the State of California, which had issued oil leases on it, never owned it in the first place and that it really was federal property.

This was a new one on the Land Office, and it sent the file upstairs to the secretary. Ickes and his lawyers pondered the problem and rejected the claim. That was that, and just an interesting little deviation from routine.

But the incident set the Old Curmudgeon to thinking. Maybe these guys had something after all. Maybe the states didn't have a clear title beyond the low-tide mark, even though everybody had assumed so for 150 years. Maybe the federal Government could grab these oil properties and put itself in the oil business.

This was a new and revolutionary idea, and any new and revolutionary idea was meat for Ickes. The more he thought about it the more he sold himself on the scheme. Of course Ickes had no intention of parceling out the tidelands to scrip holders; not Ickes; once he got his mitts on it the federal Government would stay in control.

So he talked the Department of Justice into filing suit, and began a long campaign of propaganda in the so-called liberal press to put over the idea that in some way or other the states had "stolen the peoples' oil." Ickes himself is long since gone from the public scene, but the scheme he plotted is still with us.

And that's how the whole thing got started—by a couple of wise guys who hoped to use a slick legal trick to grab off a piece of valuable property to which they had no moral right. "Honest Harold" Ickes nipped their plan in the bud—and then turned their trick around and adopted it in such a grandiose scale that he was able to hoodwink a lot of people, including the Supreme Court, into thinking that the states were stealing property from the Government instead of the other way around.

Your Nose Knows

ONCE an oil man, always an oil man, it is said, and this is the sentiment of one of our long-time readers who asked us not to renew because he was leaving the industry to join the engineering staff of the Atomic Energy Commission. But he added:

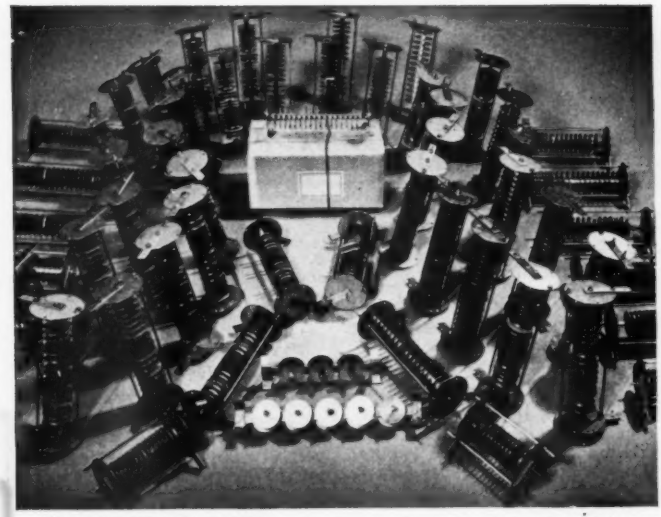
"When I return to the business you will hear from me again for I will never outgrow the fascination that comes from the smell of crude oil when making a test on a well. Every copy of The Oil and Gas Journal has usually had some article in it that was interesting and educational to me."

It saddened us to read this letter. Some folks say that atomic energy will replace petroleum after a while, but we are certain that nothing will ever replace the fascination that comes from the smell of crude oil when making a test on a well.

Popular Solution

DISCLOSURES of the extent of corruption in the Bureau of Internal Revenue and the rackets, which have been devised to avoid paying taxes suggests that maybe this country should solve the problem of enforcing the income-tax law the same way it solved the problem of enforcing prohibition—repeal the whole thing.

Henry D. Ralph



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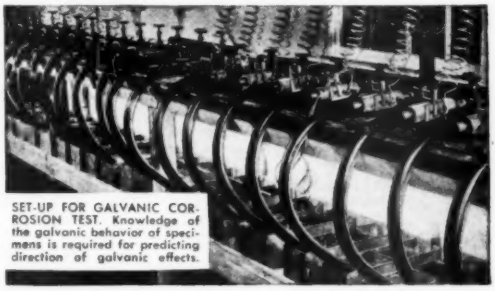
A great deal of important data comes from INCO's large scale marine testing stations at Kure Beach and Harbor Island, and from stations having industrial and rural atmospheres. In addition, technical literature, reports, and manufacturer bulletins contribute useful information.

Our files contain data from more than 2,000 plant tests on some 40,000 metal and alloy specimens. All information is tabulated on standard forms, and a punch card key sort system facilitates finding specific data.

We freely provide the Corrosion Data Work Sheet, illustrated, for presenting your specific problems.



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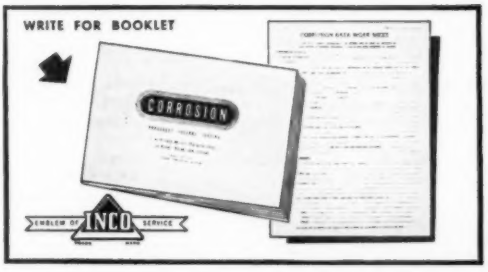

Whenever you need assistance in solving a corrosion problem, our Corrosion Engineering Section will gladly cooperate with you. A free copy of the new booklet entitled "Corrosion" may help you defeat corrosive attacks...write for it now.

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December 13, 1951

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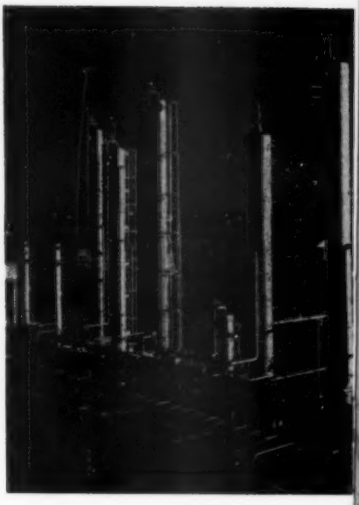
WARREN'S *Stabilized* NATURAL GASOLINE OR STA-VOL-ENE



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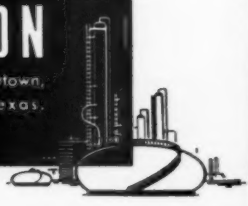


Crude Oil, Natural Gasoline and Liquefied Petroleum Products

Secondary No More

The oil industry needs a new word to replace the misleading and now outdated term "secondary recovery" to describe the process of producing crude by injecting gas into the formation or flooding it with water.

Such processes are no longer secondary in time of application, in importance of the oil they produce, nor in the thinking of the industry's researchers and operators. They are now an integral part of reservoir engineering, and are considered in the very early stages of development.

The term arose, of course, many years ago when water flooding was applied only to played-out stripper fields which were on the point of being abandoned. Flooding was then thought of as yielding a "second crop" of oil after the end of "primary recovery" through natural forces of the reservoir. Very often, too, flooding or repressuring was done by a secondary operator, a sort of salvager who moved into a field to glean the residue which the original developers abandoned.

The potentialities of water flooding were brought to notice largely by accident two score or more years ago. Men thought that water would ruin an oil pay until a water sand inadvertently permitted to drain into a producing zone unaccountably increased the oil production of nearby wells. In other areas the necessity to dispose of salt water led some operators, in desperation, to inject it into the producing formation, and to their astonishment the oil output increased.

Little by little such casual happenstances unfolded the true function of water drives in oil production, and at the same time the mechanics of gas drives was being learned. It took virtually a whole generation of oil men to develop the present science of reservoir engineering, and during most of this development period the methods were habitually thought of as secondary recovery. They were given secondary place, too, in most of the industry's research work.

Today, however, it is realized that the so-called secondary reserves are a highly important and sizable portion of the nation's fuel supply, more accessible, more economical, and more worthy of research attention than oil from shale or coal.

Water flooding is big business today. Large investments are being made in projects all over the country, and much technological skill is being devoted to solving the ramified problems involved in extracting the last remaining crude, whether by the injection of fluid or gas.

The science of reservoir engineering has advanced now to the logical point where the final cleanup methods are planned early in the productive life of a new field, and there is no break, either in ownership or in reservoir drive, between initial flush production and the ultimate last scouring. The oil industry's job is maximum recovery of crude from the ground, and anything which contributes to that end is primary.

THIS WEEK

45,000 JUST LIKE THIS.—PAD has asked DPA for 2,141,988 tons of steel for petroleum-industry operations for the second quarter of 1952. Bruce K. Brown, deputy petroleum administrator, has called for a minimum of 45,000 wells next year, and preferably 46,000 if steel needs can be met.

STEEL.—PAD, anticipating at least 45,000 wells next year, and perhaps 46,000 if steel needs can be met, asks DPA to supply 2,141,988 tons for petroleum-industry operations during second quarter in 1952. . . . ¶PAD foreign program will call for enough steel and materials for 5,443 new wells outside U. S. . . . ¶Phillips Petroleum's problem is typical of how uncertain steel supply limits efforts to expand crude-oil output. . . . ¶Operators requiring priorities assistance in getting line pipe for small construction, production operations can now use new form PAD 26LP. . . .

SUPPLY AND DEMAND.—Total demand for crude, products next year forecast at 7,841,000 bbl. daily by Bureau of Mines. . . . This represents an increase of 378,000 bbl. or 5.1 per cent over revised estimate for 1951. . . . ¶New England area will have adequate supplies of heating oils, kerosine this winter, barring prolonged severe weather. . . .

PRICES.—Provisions of Capehart amendment to Defense Production Act apply to production of crude oil as well as refined products, OPS acknowledges. . . . Individual producers will be permitted to apply for adjustments of present ceiling prices to cover all increases in cost of materials, labor, overhead between 1950 base period and July 26. . . . ¶Leonard Pipe Line Co. announces 9 cents per barrel increase in price of St. Helens, Rose City, Michigan, crude, with OPS sanction. . . .

INDUSTRY.—Dedication of Texas Illinois Natural Gas Pipeline Co.'s 1,417-mile system held in Joliet, Ill. . . . Carrier now supplying Chicago metropolitan area with 374,000,000 cu. ft. of gas daily from Gulf Coast. . . . ¶Construction begins on $32,000,000 National Petro-Chemicals Corp. plant near Tuscola, Ill. . . . ¶A.I.Ch.E. hears details of new Arosorb process. . . .

WASHINGTON.—Materials division of PAD reorganized so it can concentrate on procurement of allocations, priorities, directives from DPA, NPA. . . . OPS studying formula for pricing of new lubricating oils. . . . ¶Huffman, formerly with Sun Oil Co., appointed assistant director of PAD's refining division. . . .

TRENDS.—Rotary rigs operating in the United States on December 3 set a new all-time record at 3,016. . . . The average for 5-week period ended December 3 was 565 rigs greater than for same weeks last year. . . . ¶West Texas-New Mexico area gained 254 rigs or 45 per cent of the total increase. . . . Rocky Mountain area averaged 197 rigs for the 5-week period, up 55 per cent from last year. . . .

ACTIVITY.—Crude production averaged 6,144,625 bbl. daily for week ended December 8, down 18,125 bbl. daily. ¶Total well completions increased 8 to 858 for the week. . . . ¶Wildcat completions totaled 228 compared with 224 for previous week and 193 for same week last year. . . .

INTERNATIONAL.—Basra Petroleum Co. to begin exports of crude oil from its Iraq concession 9 months ahead of concession-agreement deadline as result of successful 3-year development program. . . . ¶Rioting, unrest spreading in Iran as result of worsening economic situation. . . . ¶Brazilian president urges creation of new petroleum agency which would nationalize operating end of business. . . .

REFINING.—Shamrock Oil & Gas Corp. lets contract to Lummus Co. for design and construction of first commercial unit to employ continuous contact coking. . . . Plant will process 1,000 bbl. daily at company's 10,000-bbl. refinery at Sunray, Tex. . . . ¶Work on revamping Sid Richardson Refining Co.'s 20,000 bbl. per day refinery at Texas City, Tex., nearing completion. . . . ¶PAD calls for increase of 1,000,000 lb. a month of naphthenic acid.

PIPE LINES.—Texas-Ohio Gas Co. arranges for interim financing of its proposed 1,350-mile, 30-in. natural-gas trunk line from Texas to near Spencer, W. Va. . . . ¶Ashland Pipe Line Corp. to participate in financing and use of Rancho Pipe Line System's proposed 463-mile, 24-in. crude line from McCamey, Tex., to Houston. . . . ¶Gulf-Michigan Gas Transmission shelves plans to build 789-mile line from Louisiana to Indiana. . . .

AT DEDICATION.—Officials attending dedication ceremonies at Joliet, Ill., last week of Texas Illinois Natural Gas Pipeline Co.'s new system included, left to right: Mark V. Burlingame, vice president in charge of operations for Texas Illinois and Natural Gas Pipeline Co. of America; Joseph J. Hedrick, president and general manager of both pipe-line companies; Mayor Martin H. Kennelly of Chicago; and James F. Oates, Jr., chairman of Peoples Gas Light & Coke Co., and chairman of the board of both pipe-line companies.

Pipe Line Dedicated

Texas Illinois' 1,417-mile system now supplying Chicago metropolitan area with 374,000,000 cu. ft. of gas daily

Paul Reed

JOLIET, Ill.—With the lighting of a gas flare by Oscar E. Hewitt, public-works commissioner for the city of Chicago, the new $135,000,000 Gulf Coast-to-Chicago system of Texas Illinois Natural Gas Pipeline Co. went into operation—only 15 months after start of construction.

More than 400 guests attended the dedication ceremonies at the company's metering station here. Among officials of the pipe-line firm were Joseph J. Hedrick, president; and James F. Oates, Jr., board chairman of Texas Illinois and chairman of Peoples Gas Light & Coke Co., Chicago.

Hewitt's lighting of the flare signified the first utilization of the natural-gas supply transmitted by the 30-in. line.

The 1,417-mile line, running from Falfurrias, Tex., to Joliet, has more than 1,000 miles of 30-in. trunk line plus feeder lines of smaller diameters. Initial capacity, with 50,000 compressor horsepower at five stations, is 374,000,000 cu. ft. daily.

Gas transmission during December will be at the rate of 250,000,000 cu. ft. daily, and ultimately capacity will be raised to 524,000,000 cu. ft. daily by increasing compressor facilities to a total of 154,000 hp. at 11 stations.

Gas supply.—Daily capacity of the six areas on the Texas Gulf Coast which supply the line include: La Gloria area (gas furnished by La Gloria Corp. et al.), 85,000,000 cu. ft.; Von Blucher area (La Gloria Corp.), 48,000,000 cu. ft.; Old Ocean area (Magnolia Petroleum Co. and J. S. Obercrombie Co.), 114,000,000 cu. ft.; Chocolate Bayou (Phillips Petroleum Co.), 28,000,000 cu. ft.; Hagis Ranch (Atlantic Refining Co.), 45,000,000 cu. ft.; and Clayton-San Caja area (Magnolia Petroleum Co. et al.), 30,000,000 cu. ft.

Four of the five compressor stations have been completed. Construction is still in progress at the Hoffman station near Centralia, Ill. Other work remaining to be done includes the laying of the second and third lines this month as permanent facilities across the Mississippi River 30 miles north of Cape Girardeau, Mo. Earlier plans for a Mississippi bridge were discarded. A second temporary 20-in. line is being laid across the Red River near Texarkana. Next spring the temporary Red River lines will be supplanted by a pipe line bridge.

Storage facilities.—Underground storage will be developed at the "Herscher Anticline" in Kankakee County, Illinois, 40 miles south of here. Drilling is starting on 3 wells of a 50-well program which will be undertaken on 15,000 acres in the next 2 years to provide 90,000,000,000 cu. ft. of storage in a highly porous and permeable brackish-water sand, approximately 100-ft. thick at a depth of 1,700 ft. Injection will commence in the summer of 1953 for serving peak loads in the winter of 1953 and 1954. Some of the wells will be used for observation to insure that the necessary 20-ft. "freeboard" of reservoir water is maintained for holding the stored gas within the sandstone of the anticline.

Distribution. — Approximately 80 per cent of the volume of gas transmitted through the Texas Illinois line will be delivered to Chicago, which is also served by the two lines of Natural Gas Pipeline Co. of America from the Texas Panhandle. The three lines of these two companies are rated with a top delivery capacity totaling 880,000,000 cu. ft. daily. Peoples Gas Light & Coke Co. owns 67 per cent of the common stock of Texas Illinois and all of the common stock of Natural Gas Pipeline. These three trunk lines terminate at the Joliet meter station.

From Joliet gas is transmitted to Chicago through another affiliate of Peoples Gas, Chicago District Pipe Line Co., which has four lines of 24-in. diameter, with the exception of one 20-in. section. The 35-mile 20-in. Joliet-Volo extension of Texas Illinois serves connections on the north and northwest side of Chicago.

Peoples Gas handles all distribution in Chicago to nearly a million customers. These are served by a mixed gas consisting of 80 per cent natural and 20 per cent manufactured gas by thermal count.

(Planning and construction of the Texas Illinois project were featured in a special section of The Oil and Gas Journal, May 3, 1951, issue, pages 81-111).

Petrochem Project

Construction under way on new $32,000,000 plant

NEW YORK.—Ground was broken last week near Tuscola, Ill., for National Petro-Chemicals Corp.'s new $32,000,000 plant, the largest of its kind in the world.

The company was organized last June by National Distillers Products Corp. and Panhandle Eastern Pipe Line Co. on a 60-40 per cent basis.

The plant will recover ethane from natural gas transported through Panhandle's main transmission line from

Texas to the Midwest. Ethane will be converted to ethylene, which in turn will form the basis for synthesizing ethyl alcohol and ethyl chloride.

Products.—Ethane separation, to be carried out by extraction, will yield propane, n-butane, and limited quantities of isobutane and natural gasoline, all of which will be marketed initially as fuel components. The company has made provision in plant layout and design for future product expansion and diversification. The capacity of each facility can be doubled quickly and simply with little or no interference with production. National Petro-Chemical's products will include raw materials for industrial solvents, ammonia, and intermediates used in the manufacture of plastics, synthetic fibers, and fertilizers. New facilities now planned will tap only a small portion of raw materials available, officials said.

J. F. Pritchard Co. of Kansas City has been awarded the contract to construct the extracting and fractionating facilities and the general service facilities for the new plant. The ethylene plant will be built by Lummus Co. of New York. Vulcan Copper & Supply Co. will construct the ethyl alcohol plant. Construction workers at the plant site will vary from 500 to 1,000 during the next several months.

Operation dates set.—Extraction and fractionation units, together with L.P.G. and other liquid storage will be in operation by October 1952. The chemical plant which will convert ethane to ethyl alcohol and ethyl chloride are expected to commence operations by the spring of 1953.

The company will maintain an operating payroll of approximately 300, while in addition to local purchases will represent a local expenditure of several million dollars annually. Most of the new plant's production has already been committed under long-term sales contracts.

President of the new corporation is John E. Bierwirth, who also heads National Distillers Products Corp. Dr. Robert E. Hulse, director of research for National Distillers, and Edward Buddrus, president of Panhandle Eastern, are vice presidents of the new firm. The new secretary-treasurer is Thomas A. Clark, who holds the same offices with National Distillers.

Typical Steel Problem

Phillips case is example of how uncertain supply of steel limits efforts to expand crude-oil production

HOUSTON.—The extent to which the availability of steel limits the activity of the oil industry in its efforts to expand production is well exemplified by the problems facing Phillips Petroleum Co.

And at the present the outlook for sufficient steel is not promising, with the result that the company must gear its entire 1952 planning to the quantities it feels assured of receiving. The problems involved were sketched by Paul Endacott, president of the company, during a visit to Phillips' operations on the Gulf Coast.

The Spraberry trend of West Texas, the Williston basin of Montana and North Dakota, and the Rocky Mountain area all hold promise of producing much new crude oil next year provided steel is available to drill additional wells and to construct pipe lines to move the new crude to refineries, in Endacott's opinion. But a company like Phillips, which normally drills around 600 wells per year, must tailor its expansion plans to the quantities and types of steel the Government makes available to it.

Spraberry.—The Spraberry is the primary drilling area for Phillips during 1952. The company now has 20 wells drilling in this play and has completed about 100 out of a programed 500 wells in proven acreage, but how far the company can go in developing this newly discovered source of crude depends entirely on the quantity of oil-country tubular goods it will be able to obtain.

Williston.—The Williston basin is not yet an important source of crude but the recent successful wildcats in that vast area are highly important in testing known structures and proving the presence of oil there, in Endacott's view. He pointed out that the basin has been known geologically for years and the suitable structural features and the necessary sedimentary beds have long indicated the probable presence of oil, but other basins which looked equally promising have proved to be largely unproductive when tested by the drill.

Nevertheless, the drilling results and seismic work to date are so promising that Phillips has acquired leases on 1,800,000 acres and the company is planning a long-range program to test the possibilities of Williston. At present Phillips is drilling a well on West Poplar dome in eastern Montana and has an interest, along with Carter Oil Co., in another Williston well being drilled by C. H. Murphy.

Rocky Mountains.—Throughout the Rocky Mountain region, as well as in the Williston basin, new pipe lines must be constructed in order to bring to market the additional oil made available by new drilling developments. Endacott emphasized this as illustrating how the entire industry is in a tight situation because the availability of steel dictates the quantity of oil which can be made available to refineries and the areas from which it is to come.

Offshore.—Still another known source of available crude is the offshore reserve of the Gulf Coast but where development is suspended awaiting what Endacott described as "clarification" of title between state and federal governments.

Here, said Endacott, are tremendous known reserves of oil and gas, much needed as a cushion against emergency requirements or loss of foreign supplies, but development cannot proceed until settlement of the present political stalemate.

In its other operations Phillips has been expanding constantly during the postwar period and has plans for continued expansion to the limit of available steel. For example, the company's refinery at Sweeny, Tex., constructed during the war as an 18,000-bbl. plant, has been so enlarged that its throughput has reached 80,000 bbl. per day. Phillips' extensive petrochemical activities are also being expanded to make greater utilization of light hydrocarbons.

Gas price hike.—An increase in the price of natural gas is anticipated by Endacott, highly important to Phillips which has reserves estimated in excess of 15 trillion cubic feet—probably the largest gas reserves of any company in the industry. He prediction is based on the growing market for gas in the Southwest, providing competition which may bid up the price of gas for interstate transmission.

Leonard Raises Crude Price

MOUNT PLEASANT, Mich.—Leonard Pipe Line Co. has announced an increase in the posted price of St. Helens and Rose City, Michigan, crude, at the well, by 9 cents per barrel.

The increase was approved by the Office of Price Stabilization in Washington under Section 3 of Supplementary Regulation 2 to Ceiling Price Regulation 32.

The price of crude from these pools was frozen below the in-line ceiling due to the expense of truck transportation. However, both areas now have pipe-line outlets.

D. Y. Hewitt, executive vice president of the pipe-line firm, said that the price increase is effective as of 7 a.m. December 1.

1952 Demand Forecast

Bureau of Mines estimates demand at 7,841,000 bbl. per day; gasoline, distillates to make biggest gains

TOTAL demand for crude and petroleum products in 1952 is forecast at 7,841,000 bbl. daily by the Bureau of Mines in a supplement to the regular crude-demand estimate for December.

This demand represents an increase of 378,000 bbl. or 5.1 per cent over the revised estimate for 1951. The bureau reports that the forecast is based primarily on the trends of domestic demand for products, assuming an ample supply of oil for all purposes. Increased military requirements of aviation gasoline and jet fuel are factors in the gain in total demand.

Exports.—Exports of crude and products are estimated at 308,000 bbl. daily for the year, representing a decrease of 119,000 bbl. daily or 27.9 per cent from the average for 1951. The report shows exports at a high level for the first half followed by a sharp drop for the last 6 months of the year.

The daily average for the first 2 quarters is set at 385,000 bbl. For the last half, the average drops to 234,000 bbl. or less than half of the revised estimate for the last 6 months of 1951 when heavy export shipments were required to supply some of the world markets normally served by the refinery at Abadan.

Domestic demand.—Domestic demand for 1952 is forecast at 7,533,000 bbl. daily, a gain of 497,000 bbl. daily or 7.1 per cent. The estimated changes in domestic demand by products include gains of 8.3 per cent for gasoline, 2.7 per cent for residual, 9.1 per cent for distillate, 7.4 per cent for kerosine, and 7.3 per cent for other products.

The report assumed that there will be no need for additions to inventories in 1952 and balances supply and demand without any change in stocks.

Since part of the production in 1951 was used to increase stocks at the rate of about 93,000 bbl. daily, total production for the year was high compared with demand. In 1952 this extra production will not be required, and the total for the year will represent a smaller percentage increase over 1951 than the gain in total demand.

Crude production.—Crude production for 1952 is estimated at 6,336,000 bbl. daily, up only 185,000 bbl. daily or 3 per cent from 1951. Production at natural-gasoline and cycling plants is expected to average 593,000 bbl. daily for an increase of 6.1 per cent.

The disruption of world markets caused by the closing of the refinery at Abadan resulted in decreased imports for this country in the last half of 1951. The bureau's latest estimate for 1951 is 846,000 bbl. daily compared with 847,000 bbl. daily in 1950.

The forecast of imports for 1952 assumes a continuation of low-level imports for the first half of the year. The average for the year is set at 912,000 bbl. daily with a peak of 1,000,000 bbl. daily in the fourth quarter.

Refinery runs for 1952 are forecast at 6,760,000 bbl. daily, up 4 per cent.

BUREAU OF MINES SUPPLY AND DEMAND FORECAST FOR 1952
(Thousands of barrels daily)

	Forecast 1952					Estimated	
	First quarter	Second quarter	Third quarter	Fourth quarter	Year 1952	Year 1951	Per cent change
Production	6,879	6,901	6,957	6,978	6,929	6,710	+ 3.3
Crude	6,286	6,319	6,370	6,389	6,336	6,151	+ 3.0
Other oils	593	582	587	609	593	559	+ 6.1
Imports	868	868	913	1,000	912	846	+ 7.8
Crude	494	516	543	565	530	504	+ 5.2
Refined	374	352	370	435	382	342	+11.7
New supply	7,747	7,769	7,870	7,978	7,841	7,556	+ 3.8
Stock change	—440	+307	+392	—261		+93	
Crude						+30	
Products	—440	+307	+392	—261		+63	
Total demand	8,187	7,462	7,478	8,239	7,841	7,463	+ 5.1
Motor fuel	2,923	3,484	3,565	3,304	3,320	3,104	+ 7.0
Residual	1,813	1,505	1,457	1,728	1,626	1,611	+ 0.9
Distillate	1,879	1,055	989	1,609	1,382	1,285	+ 7.5
Kerosine	517	253	250	478	374	356	+ 5.1
Other	1,055	1,165	1,217	1,120	1,139	1,107	+ 2.9
Exports	407	363	250	217	308	427	—27.9
Crude	55	55	43	43	49	77	—36.4
Refined	352	308	207	174	259	350	—26.0
Domestic demand	7,780	7,099	7,228	8,022	7,533	7,036	+ 7.1
Motor fuel	2,824	3,396	3,500	3,250	3,243	2,994	+ 8.3
Residual	1,736	1,440	1,413	1,696	1,571	1,529	+ 2.7
Distillate	1,802	989	957	1,587	1,333	1,222	+ 9.1
Kerosine	489	236	244	473	361	336	+ 7.4
Other	929	1,038	1,114	1,016	1,025	955	+ 7.3
Runs to stills	6,680	6,730	6,800	6,830	6,760	6,500	+ 4.0

Oils Supply Up

Study shows New England in good shape for winter

WASHINGTON.—Barring prolonged severe weather over the next 4 months, New England will have adequate supplies of heating oils and kerosine this winter.

That is the considered opinion of the staff of the Senate small-business committee based on its second annual survey of New England fuel supplies.

"Suppliers and distributors of fuel in New England, although aware of and alert to existing problems and uncertainties which could adversely affect the situation, are generally of the opinion that requirements can be met, if such steps as are necessary and practicable to assure a continuing flow of supplies are made effective soon," the committee staff reported.

Except for the possibility of adverse weather, the committee was told, "conditions are basically favorable to adequate supplies and such measures as might prove to be needed are not outside the bounds of feasibility if adjustments are not too long delayed."

Plentiful stocks.—The study showed that heating oil stocks reached an all-time high level this fall in the New England and Middle Atlantic areas but, the staff report said, there is still need for the development of greater terminal-storage capacity in the New England area so that a greater part of total winter requirements can be brought in during the off season.

Considerable concern was expressed over the effect of OPS price regulations in retarding the bringing in of adequate supplies to meet winter requirements. This situation arises from the fact that, while heating-oil prices are regulated, tanker-transportation rates are not. It is not considered practicable to subject tanker rates to price control which might divert charter tankers from coastwise service "into more remunerative channels elsewhere in the world."

The survey showed that supplies of heavy residual fuel oil for industrial use are running somewhat below a year ago.

New Process Detailed

Aromatics extraction from catalytic reformate through use of Arosorb process discussed at A.I.Ch.E. meeting

George Weber

ATLANTIC CITY. — Process variables and chemical-engineering factors influencing design of a commercial Arosorb unit were revealed here last week.

The process, first of its kind to employ selective adsorptive powers of silica gel for commercial concentration of benzene, toluene, and other aromatics, was discussed in detail by three engineers of Sun Oil Co., licensing firm, at the annual meeting of the American Institute of Chemical Engineers.

Particular emphasis was placed on practical application of the process in separating aromatics from catalytic reformate mixtures. As a typical example, the authors, James I. Harper, John Lee Olsen, and Frank R. Shuman, Jr., cited recovery by the process of benzene and toluene from 1,000 bbl. per day of catalytic reformate containing about 11 per cent benzene and 16 per cent toluene.

Description.—Briefly, the operation consists of passing dried reformate alternately through several gel cases. Charge percolates through a gel bed for about 30 minutes during which the aromatics are adsorbed by the silica gel and the saturate portion comprising olefins and paraffins pass through the bed.

A "push liquid" which may consist of butane or pentane, is charged to the bed for about 10 minutes, displacing the remaining saturates. Charge is then switched to a stream of xylenes for about 40 minutes, which desorb or remove the aromatics from the silica gel, regenerating the bed for the next cycle.

Effluent streams are switched at optimum points for segregating aromatic and saturate components, subsequently stripped of "push liquid" and desorbent by fractionation.

Example.—For the assumed charge of 1,000 bbl. per day of reformate, the example shows yields of 766 bbl. of saturate product, 95 bbl. of benzene, and 139 bbl. of toluene, through use of 370 bbl. of push liquid and 1,250 bbl. of desorbent.

This operation does not include recycling part of the gel-case effluent. Had 10 per cent of the case effluent been recycled, the push and desorbent amounts required for 1,000 bbl. per day of fresh feed would have been increased to approximately 500 bbl. of push and 1,700 bbl. of desorbent. Recycle would have increased the aromatic recovery from 85 to 95 per cent or higher and insured the production of nitration grade benzene and toluene.

The typical case is a most complicated one because it involves production of essentially pure compounds. When a stream is being processed merely for high-aromatic solvents, high-cetane diesel fuel, or similar stocks not requiring high purity, the process can be materially simplified.

For example, push need not be employed, and two distillation columns required for separating push from aromatic and saturate effluents are eliminated. However, the installation of the more complicated plant gives the refiner a wider choice in the types of stocks he may process and the quality of products produced.

For the assumed operation, the gel capacity for feed, the necessary amounts of push and desorbent, and the combined effects of percolation rate, height, diameter, and number of silica gel cases were considered.

Underlying principles of hydrocarbon separation by silica gel and the various factors important in the design of silica-gel cases also were discussed.

The authors, due to time element, restricted discussion to the one operation, though the process is extremely flexible for handling hydrocarbons of almost any boiling range, and even nonhydrocarbon streams. An over-all concept of the process preceded detailed discussion. *(The Oil and Gas Journal, July 19, 1951, page 58).*

First unit.—The first commercial application of the new Arosorb process will take place in a unit now under construction at Sun Oil Co.'s Marcus Hook, Pa., refinery. The unit will separate approximately 850 bbl. per day of benzene, 1,950 bbl. of toluene, and 980 bbl. of mixed xylenes from catalytic reformate.

The silica gel employed in the new process is a product whose properties have been adjusted to produce a highly efficient material. Its development was the result of several years' cooperative research by Sun and Davison Chemical Corp., and the gel is now produced commercially by the latter company.

NEXT WEEK

The International Number

ENGINEERING ——— ECONOMICS

You will be interested in the December 20 special number of the Journal even if you have never visited an oil operation outside the United States. Those in charge of activities at distant points have perfected methods and practices of value to operators everywhere. Here are a few of the "know-how" discussions prepared by outstanding authorities for this issue:

- Drilling and production techniques in fabulous Saudi Arabia.
- Exploration methods in New Guinea.
- Drilling practices in Eastern Venezuela.
- Petrochemicals from Middle East naphthas.
- Present status and outlook for additional field discoveries in Canada.
- Equipment and processes in Europe's new refineries.

There are more than a dozen other developments in operating methods discussed in this issue.

IN ADDITION

- A picture and map section.
- The Journal's Complete Surveys of fields and plants outside the United States.
- Proven reserves by countries, future trends in global consumption and an analysis of the highly important tanker situation are among the economic discussions of this issue.

Steel Needs Voiced

PAD, anticipating minimum of 45,000 wells next year, asks DPA for 2,141,988 tons for second-quarter operations

WASHINGTON.—A total of 2,141,988 tons of steel has been asked of the Defense Production Authority by the Petroleum Administration for Defense for second-quarter 1952 operations of the domestic oil and gas industry.

Carbon steel accounts for 2,010,963 tons of the claim, alloy for 122,657 tons, and stainless for 8,368 tons.

At the same time, PAD estimates that 47,030 tons of steel will be required for Canadian and 225,899 tons for other foreign operations. The Canadian requirements are 43,630 tons of carbon, 2,000 of alloy, and 1,400 of stainless, and the total for other foreign includes 211,527 tons of carbon, of which 62,835 tons would be plate, 12,902 tons of alloy, and 1,470 tons of stainless.

The indicated breakdown of the carbon steel sought for domestic operations includes 510,750 tons for oil and gas production; 78,776 tons for natural-gas processing, including liquefied petroleum gas; 450,930 tons for gas transmission and distribution; 551,050 tons for oil transportation; 151,200 tons for refining; 3,450 tons for marketing; 99,583 tons for maintenance, repairs, and operating supplies, and 165,224 tons for oil-field machinery and equipment.

Included in the above figures are 751,111 tons of plate, of which 4,700 tons would be for oil and gas production, 13,680 tons for gas processing, 274,777 tons for gas transmission and distribution, 339,500 tons for oil transportation, 65,000 tons for refining, 1,400 tons for marketing, 13,005 for MRO, and 39,449 tons for oil-field machinery and equipment.

45,000-well minimum.—Anticipating an increase in over-all steel production by the third quarter of next year which will increase the availability of tubular goods and line pipe, Deputy Administrator Bruce K. Brown has set a minimum of 45,000 wells for 1952 and believes 46,000 will be readily possible. The industry, he said, probably would drill anywhere up to 20 per cent more wells if materials were available but there is no indication that the tubular-goods supply will increase to anything like that extent.

In addition to drilling the programed wells, Brown pointed out, it is highly desirable that inventories of tubular goods be built up both at home and abroad. It is particularly important to replenish the depleted stocks of American companies operating abroad, he said, because of the time-consuming haul involved in getting material to points of use from the United States and the always-present possibility that an outbreak of war would interrupt ocean transportation and make the logistics problem even more difficult.

Line pipe.—So far as line pipe is concerned, Brown pointed out that the big projects initiated before controls were imposed and the highly necessary pipe lines since added will be completed over the next three quarters. PAD then will be in a position to allocate pipe to urgent projects now being held up because no material is available.

The situation in small-diameter pipe, however, is seen as remaining acute for some time to come. There is a tremendous demand for this pipe for gathering lines, around refineries, and other purposes, Brown said, and the appetite for it in the natural-gas industry is insatiable.

PAD's Foreign Program

It calls for minimum output of 5,000,000 bbl. daily in areas outside U. S.; refining-capacity increase planned

Bertram F. Linz

WASHINGTON.—An increase of more than 400,000 bbl. per day in crude production outside the United States has been programed for 1952 by the Petroleum Administration for Defense to provide a minimum output of 5,000,000 bbl. per day.

At the same time, an increase of 479,000 bbl. per day in refinery runs is contemplated to boost foreign refining to 4,400,000 bbl. per day or approximately 40 per cent of total world crude runs to stills.

Despite this extensive program, however, Deputy Administrator Bruce K. Brown foresees continuance abroad of a tight situation in aviation gasoline, residual fuel oil, and lubricating oils, the last because of the lack of manufacturing capacity. Motor gasoline will be adequate at present quality levels, he said, and gas oil and diesel fuel will be in sufficient supply, but kerosine may be short during seasons when demand is especially high.

The tanker position is relatively favorable, with vessels of 1,800,000 to 2,000,000 dwt. of new tanker space scheduled for 1952 delivery which should keep the tanker position in balance except for possible tight supply in the winter months.

5,443 new wells.—To raise foreign crude production from its present rate of 4,600,000 bbl. per day to more than 5,000,000 bbl. per day, it will be necessary to drill 5,443 new wells next year, about 75 per cent of them replacement wells.

PAD, which will have to provide the materials, has set up a total of 4,891 wells for the Western Hemisphere outside the United States, 2,000 of them in Canada, 1,424 in Venezuela, 482 in Mexico, 275 in Peru, 246 in Argentina, and 464 in other countries. A production of 2,395,000 bbl. per day is aimed at, of which 1,744,000 bbl. would be in Venezuela, 210,000 in Mexico, 145,000 in Canada, 120,000 in Colombia, and 56,000 in Trinidad. The total increase over 1951 would be 138,000 bbl. per day of which 106,000 would come from Venezuela, 20,000 from Canada, and 10,000 from Colombia.

Against the nearly 5,000 new wells scheduled for the Western Hemisphere, only 590 wells will be necessary throughout the rest of the world to provide a production of 2,620,000 bbl. per day, of which 274 would be in the Far East, 153 in the Middle East, 67 in Europe, 52 in India and Pakistan, 4 in Africa, and 2 in Ethiopia. Production totals would be 2,240,000 bbl. per day for the Middle East, 170,000 for Indonesia, 100,000 for Borneo, 49,000 for North Africa, and 45,000 for Europe. The increase over

TABLE 1
(Barrels per day)

	1951 capacity	1952 capacity	Increase	1951 runs (est.)	1952 runs	Increase
Canada	365,000	397,000	32,000	340,000	360,000	20,000
Other W. Hemisphere	1,695,000	1,764,000	69,000	1,589,000	1,689,000	100,000
United Kingdom	295,000	387,000	92,000	275,000	400,000	125,000
Other Europe	840,000	947,000	107,000	739,000	920,000	181,000
Middle East	907,000	924,000	17,000	668,000	695,000	27,000
Far East	334,000	347,000	13,000	277,000	303,000	26,000
Other E. Hemisphere	143,000	155,000	12,000	63,000	70,000	7,000

TABLE 2

Country and company	Size (in.)	Length (miles)	Capacity (bbl./day)
Saudi Arabia, Aramco—Ain Dar to Abqaiq	20-22	20	100,000
Saudi Arabia, Aramco—Uthmaniyah to Abqaiq	30-31	55	200,000
Kuwait, Kuwait—Burgan field to Ahmadi farm	20	14.5	300,000
Kuwait, Kuwait—Burgan-Ahmadi to Gravity loading line	30	6.5	300,000
Iraq, Mosul—Ainzalah to Kirkuk line	12	140	26,000
Iraq, I.P.C.—Kirkuk to Banias (Syria)	30	233	
	32	233	
	26	90	
		556	314,000
Iraq, Basra—Zubair field to Fao	12	65	
	16	10	
		75	52,000
Venezuela, Creole—Ule to Amuay	26	125	200,000
Venezuela, Creole—Lagunillas to La Salina	34	25	175,000
Venezuela, Meneg—Anaco to Pt. La Cruz	26	30	*300,000
Venezuela, Meneg—Oficina to Anaco	16	15.5	*290,000
Venezuela, Shell—Palmarejo to Cardon	30-32	145	200,000
	(20-in.—10 miles under lake)		

*Includes present and proposed capacity.

1951 would be 270,000 bbl. per day of which 3,000 would come from North Africa, 80,000 from Iraq, 167,000 from the rest of the Middle East, and 20,000 from Indonesia.

Refining. — Replacements and additions to refineries planned by PAD will increase foreign capacity by 342,000 bbl. per day to a total of 4,921,000 bbl., and it is contemplated that runs will increase 486,000 bbl. per day to 4,437,000 bbl. These expansions, by areas, are shown in Table 1.

Crude lines.—Twelve new crude pipe lines, all but two with a capacity of 100,000 bbl. or better per day, are scheduled for completion in 1952 and will provide a total transportation capacity of some 2,457,000 bbl. per day. These lines, which may have to be supplemented by others to handle an increased flow of both crude and products, are shown in Table 2.

The handling of this program is the responsibility of PAD's foreign branch, headed by Assistant Deputy Administrator C. Stribling Snodgrass. It was developed as far back as last September and is based upon the physical factors in relation to the production, refining, supply, and transportation of crude and its products, and was submitted to the foreign petroleum committee, an interagency group of which Snodgrass is chairman, for integration of the various political, diplomatic, economic, and strategic factors involved.

A second group, the foreign materials committee, then translated the program in terms of materials requirements and, following approval by the Defense Production Administration, the necessary allocations of materials were made by the National Production Authority.

OIT's role.—In the handling of foreign-operations problems the Office of International Trade of the Department of Commerce is an important factor, since it is the agency that decides how much material may be shipped from the United States through its control of export licenses.

Upon representations by PAD that companies operating abroad have in many instances depleted their inventories of materials to the danger point, the OIT has authorized advance allocations for maintenance repair, and operating supplies, permitting the foreign operators to draw up to 75 per cent of their allocations for the quarter ahead.

Areas of particular interest to the foreign branch at the moment are Venezuela and Canada. In Venezuela, lack of materials may retard the drilling of necessary replacement wells, while in Canada the major need is for pipe-line transportation to the Pacific Coast.

New Canadian reserves.—The latest estimate of reserves from the new areas in Canada is 1,800,000,000 bbl., an increase of 700,000,000 bbl. over previous estimates. Over one period of 7 weeks a new field was found each week. Consideration will be given in the near future to the building of a pipe line to carry crude to the West Coast and a definite plan may be developed early next year. Two projects have been suggested, one an all-Canadian line which might have a spur into Washington, the other a line traversing both Canada and the United States to Seattle.

Three divisions. — The problems of foreign operators are handled through the three divisions of the foreign branch. Charles B. Rayner, former petroleum consultant to the State Department, is serving as a special assistant to Snodgrass. The foreign-production division is headed by William H. Farrand, of The Texas Co., as director, with Al Lager, former petroleum attache of the State Department at Cairo, as assistant director, and James J. Brazil of Drilling & Exploration Co., as chief of the exploration and reserves branch.

The foreign refining division is under George T. Ballou of Standard Oil Co. of California, with Henry Noel of Standard Development Co. as special assistant; Joseph K. Kelsey of Socony-Vacuum Oil Co., Inc., as chief of the refining facilities branch; and Reuben A. Keppel of Standard Oil Co. (N. J.), as assistant chief of the operations branch.

John A. Walstrom of Asiatic Petroleum Co. is director of the foreign supply and transportation division, with David H. West, retired oil man, as chief of the distribution branch. George Knight of Continental Oil Co. is assistant director of materials in charge of material coordination.

Avgas in Balance

WASHINGTON.—Aviation-gasoline supply and demand are currently in practical balance as a result of industry cooperation and support by Orders 3 and 4 of the Petroleum Administration for Defense.

When those orders were issued October 19, there was a shortage of 25,000 bbl. daily of aviation gasoline which threatened to continue through the remainder of the year. The shortage has been reduced to less than 5,000 bbl. daily, and the supply now is sufficient to meet all needs on a day-to-day basis. However, it has not been possible to build up inventories.

PAD officials said the companies responded whole-heartedly to their plea to increase aviation-gasoline production.

Fast Tax Write-Off O.K.'d

WASHINGTON. — Certificates of accelerated amortization for $939,110 of $1,031,045 to be invested in gasoline-production facilities in Ector County, Texas, by Phillips Petroleum Co. have been issued by the Defense Production Administration.

The certificates provide for 65 per cent amortization of $582,980 and 40 per cent of $356,130 over a 5-year period.

A certificate also has been issued for 90 per cent quick write-off on $90,000 for aviation-gasoline facilities for Maritime Oil Co. at Houston.

New Defense Orders

WASHINGTON.—The following order have been issued by the defense agencies:

Office of Price Stabilization

GOR 21, December 5: Extending the provisions of the Capehart amendment to crude oil and petroleum products.

National Production Authority

Amendment to M-41, December 3: Prohibiting the diversion of machine tools covered by government pool order contracts to fill private nonpriority rated orders, effective February 1, 1952.

Dir. 3 to NPA Reg. 2, December 3: Modifying the regulations on the issuance of defense ratings for chemicals.

WATCHING WASHINGTON

Bertram F. Linz

Transport Threat

The world-tanker situation currently is good, but oil companies engaged in operations in the Middle East and government officials in Washington and London are uneasy.

What at the moment is a satisfactory movement of Middle East oil could overnight become a problem of the first magnitude through the closing of the Suez Canal.

There has been no indication that Egypt will close the canal, but the British are having to fight vigorously to keep it open, and the repeated clashes with Egyptian extremists attempting to wreck installations are not calculated to make anyone feel that the waterway is secure.

Over the past 18 months there have been rumors that this or that situation might result in rationing of oil in the United States. The blocking of the Suez Canal might do more toward bringing that about than all past situations combined.

Tankers from the Middle East for European ports now traverse the Persian Gulf, Arabian Sea, turn through the Gulf of Aden into the Red Sea, through the Suez Canal and into the Mediterranean. With the canal closed, they would have to go down the Indian Ocean and around the Cape of Good Hope to the Atlantic.

Something over 1,000,000 bbl. of oil a day is being moved out of the Middle East by tanker. Any interruption of present routes would substantially reduce the effectiveness of the fleet now used in that service and raise a serious problem.

Oil and Rubber

Cheaper synthetic rubber is in the offing through the use of oil as an "extender," but technologists must first determine the effects of oil on requirements for accelerators and other compounds used in producing rubber goods.

Considerable work has been done on the use of oil in the production of rubber over the past year, spurred by the fact that the oil is low in cost per pound compared with styrene and butadiene. This development has obvious possibilities in conserving the supply of styrene and butadiene, increasing the output of existing copolymer plants, and lowering the cost per pound of rubber produced.

The process, briefly, consists of producing a polymer of higher molecular weight than standard GR-S through changes in reactor operations in the plant. In the latex stage, the oil is added in emulsion form, and the resulting dry rubber has a molecular weight corresponding with normal GR-S along with most of its properties.

Although synthetic-rubber production is edging up toward the 800,000 tons a year mark, plans are being made for a further increase to possibly as much as 1,000,000 tons. A production capacity of nearly 950,000 tons a year has been authorized as soon as it can be brought into production.

Wary Manufacturers

The Federal Trade Commission continues to protest that it has no intention of seeking to outlaw functional discounts granted by manufacturers, but reports to the contrary crop up faster than the commission can knock them down.

Suspicion that the FTC was aiming at the elimination of wholesaler discounts arose last year as the result of an action against several manufacturers of spark plugs charged with violation of the Robinson-Patman Act. The case was based on the alleged illegal discrimination in prices among customers who are in competition with each other.

One of the charges in that case was that several major oil companies received a 10 per cent discount on plugs not available to independent parts wholesalers. The case was heard and argued last year, but the commission has not yet rendered its opinion.

Recent statements of FTC officials have given little indication as to how the commission eventually will rule. They point out that the law does not permit the commission to outlaw discounts, but hedge this by saying that it permits differentials in price only when they result from varying and justifiable differences in cost of manufacture, sale, and delivery, and provided they are the same to all who compete in the same market.

The spark plug case is only indirectly of importance to the oil industry. But the principles laid down when the case is decided might well become a pattern for actions that would more directly affect the industry in the same way that the decision in the Cement Institute case affected basing-point pricing generally.

New Pipe Form

PAD application blanks to be used for small projects

WASHINGTON.—Operators requiring priorities assistance in getting line pipe for small construction and production operations and MRO purposes will use a new form just issued by the Petroleum Administration for Defense for second-quarter and subsequent needs.

The new form, PAD 26LP, will cover requirements for line pipe for use in small-construction projects, production operations, and MRO when the total quarterly line-pipe cost for those uses is $5,000 or more.

Line pipe for large construction projects as defined in the NPA M-46 order will still be applied for on Form PAD 26. This form covers construction projects in which the total cost of the controlled material (steel, copper, and aluminum) is $5,000 or more, and projects that involve the erection of any building, warehouse, office, residence, or other enclosed structure exceeding $5,000.

Separate application.—When an operator is required to file PAD 26LP because his need for line pipe totals $5,000 or more per quarter he must file separate applications for each operation as listed on the form. If his total quarterly requirement for new line pipe for these purposes is less than $5,000 he may use either the new form or file delivery orders with PAD under the M-46 order.

In the future an original and three copies of PAD 26LP must be filed on the first day of the first month of each calendar quarter to cover the operator's new line pipe requirements for the succeeding quarter.

Transport Study Near End

WASHINGTON.—The first comprehensive study of transportation available to the oil industry and a forecast of future needs will be published by the Petroleum Administration for Defense before the end of the year.

The PAD study will present analyses of probable future petroleum demand, estimated future refinery capacity, and estimated future producibility of crude and natural-gas liquids. It will project the minimum transportation requirements for tank trucks, railroad tank cars, pipe lines, barges, ocean tankers, and storage facilities.

The book is now being printed and will be sold by the Government Printing Office at an indicated price of about $2. In order to gage the necessary issue, PAD is urging all persons interested to place their reservations for "Transportation of Oil" with the Superintendent of Documents, Washington 25, D.C. No money need accompany reservations.

Price Loophole

Crude producers now may apply for upward adjustments of ceilings to cover higher costs as result of OPS decision

WASHINGTON.—Provisions of the Capehart amendment to the Defense Production Act apply to the production of crude oil as well as to refined products, it is acknowledged by the Office of Price Stabilization.

As a result, individual producers will be permitted to apply for adjustments of their present ceiling prices to cover all increases in costs of materials, labor, and overhead between the 1950 base period and July 26, 1951, under OPS General Overriding Regulation 21.

Whether crude oil would be covered by the Capehart amendment has been a question with which the OPS legal staff has been struggling for several months. Industry sources estimate that the increase in ceilings by application of the Capehart provisions will run around 13 per cent.

Some OPS officials contend the Capehart amendment was written in such way as to cover only manufactured products, but in announcing the issuance of GOR 21 it was stated that "after consideration, the agency concluded that it had no choice other than to allow applications for adjusted ceiling prices from these (extractive) industries."

The overriding regulation, so-called because it cuts across many existing regulations, provides a procedure under which any eligible business can apply for new ceilings if it feels that it can better its position through use of the Capehart formula. Its use is entirely optional, and applications for adjustment may be filed now or at a later date, as the applicant's circumstances dictate.

Forms required.—In general, operators will calculate their new ceilings by adding to or subtracting from the base-period price the increases or decreases in costs for materials, labor, and overhead between their base date and last July 26. Five separate forms must be filed with OPS, supplying general data (on Form 109), listing base period commodities (Form 110), listing "representative" commodities (Form 111), giving prices and other data for new commodities (Form 112), and mandatory profit-and-loss statements (Form 113).

The order provided no clear-cut way by which oil producers could apply for price relief and OPS officials said it would be necessary to call a meeting of the industry-advisory committee to discuss the formulas to be followed.

Satisfaction voiced.—The OPS action, even though it will require clarification, was received with considerable satisfaction by producer representatives in Washington. Several applications for price relief filed by producer associations have been before OPS officials for some time. In addition the Independent Petroleum Association of America is now working up material which is expected to develop whether the relief granted under the Capehart amendment will be adequate to meet operators' needs for a price at which they can continue their customary exploration work.

PAD Shakeup

Materials group aims at closer liaison with NPA

WASHINGTON.—The materials division of the Petroleum Administration for Defense has been reorganized to enable it to concentrate on the procurement of allocations, priorities, and directives from the Defense Production Administration and National Production Authority.

The materials division will attempt to meet the material and equipment requirements approved by the PAD operating divisions. It now is set up on a commodity basis closely aligned with the organization of NPA to permit closer liaison between the two agencies. This will keep NPA advised of PAD's requirements for all items of major importance, whether controlled materials or "B" items, and keep the PAD operating divisions advised of availability and lead time of all material and equipment in short supply.

Facilities advice.—The division, through its contacts with DPA and NPA and consultation with the industry, also will develop details as to the manufacturing or production facilities of controlled materials and bottleneck Class B items to assist the operating divisions and the industry in eliminating delays and interruptions in their approved programs.

Major responsibilities of the division will be to represent PAD on the various committees of both NPA and DPA and, through personal contact with NPA and DPA personnel, assist in the accumulation and presentation of PAD's material and equipment requirements.

The processing of requests made by petroleum operators for priority assistance has been turned over to the interested operating divisions to enable them to maintain closer surveillance over the distribution and use of materials. The processing of oil-field machinery and equipment-manufacturing requests, however, will continue to be handled by the materials division, as will requests from chemicals manufacturers.

Materials distribution.—The distribution of controlled materials among the operating divisions will continue to be made by the materials-requirements committee and the responsibility of accounting for disbursements to DPA will be retained in the materials division. It will also continue to handle the centralization of receipts, records, and final issuing of all "projects," as well as the necessary scheduling of all components.

Assistant Director Hugh R. Lamberth will be responsible for materials procurement, Assistant Director Herbert R. Hansen will deal with program coordination and administration, and Assistant Director George W. Knight will be responsible for coordination of materials for foreign petroleum operations. All three assistant directors will report to Materials Division Director Richard M. Morrison.

Washington Briefs

The Office of Price Stabilization is studying a formula for the pricing of new lubricating oils at levels which will not result in a general advance in the price of all premium oils. It also is considering a recommendation for the industry that no effort be made at this time to impose dollars-cents ceilings on asphalt and asphalt products.

Commissioner Harrington Wimberly of Oklahoma has been elected vice chairman of the Federal Power Commission for 1952. Under the provisions of the Federal Power Act, the commissioners each year select one of their number to serve as vice chairman.

Loring T. Cramer, former assistant general sales manager for Continental Oil Co., Ponca City, Okla., has been named chief of the petroleum branch of the Office of Price Stabilization, succeeding O. D. Judd, who resigned last month to join the Sinclair Refining Co.

Walter C. Huffman, formerly with Sun Oil Co., has been appointed assistant director of the PAD Refining Division and will supervise the development of over-all materials requirements and the distribution of materials for refineries. Huffman joined PAD in October 1950 as an aviation-fuels technologist and last December was named assistant director of the aviation-fuels program. He is serving without compensation.

MID-CONTINENT

Sinclair Research Expanding

Sinclair Research Laboratories, Inc., is expanding its activities in petroleum production and exploration research. Production-research activities of Sinclair Oil & Gas Co. will be consolidated with those of the Sinclair laboratories.

Two buildings on property in Tulsa will be altered to improve facilities and extensive shop and research-testing equipment at Harvey, Ill., is to be made available to the production-research staff.

P. C. Spencer, president of Sinclair Oil Corp., revealed plans for the expanded operations in Tulsa this week in an address on "Our Cities of Tomorrow" before the annual meeting of the chamber of commerce.

Flooding Results Revealed

WASHINGTON. — More than 33,000,000 bbl. of oil have been recovered over the past 20 years from 162 active and abandoned oil wells in Oklahoma through water-flooding operations involving the pumping into formation of some 450,000,000 bbl. of water.

Results of water-flooding operations in Oklahoma between July 1942 and the end of 1949 are described in a 229-page report just issued by the Bureau of Mines.

Not all fields responded to water injection, the bureau reported, citing one project where 368,177 bbl. of water used during nearly 6 years of operation resulted in the recovery of only 7,888 bbl. of oil from a 40-acre lease.

Water-flooding was first introduced in Oklahoma in May 1931 but did not attract much attention until 1935, the bureau said. By 1941, however, the rate of recovery by this method had reached more than 3,000,000 bbl. a year. Expansion of operations was impossible during the war years but was resumed after the war. At the close of 1949, water-flooding had been done in 25 of the state's 49 oil-producing counties, covering 18,221 productive acres with a yield of more than 3,000,000 bbl. for the year.

Copies of Report of Investigations 4832, "A Survey of Oil Production in Oklahoma by Water-Flooding, Part II," may be obtained from the publications - distribution section of the Bureau of Mines, 4800 Forbes Street, Pittsburgh 13, Pa.

Industry Briefs

CALGARY, Alta.—The first major export of natural gas from Alberta may begin within 2 weeks, L. S. Stradler, manager of the gas division of Montana Gas Co., said here last week. He said work on a pipe line to carry the fuel from the province to Anaconda Copper Mining Co. of Montana is almost complete.

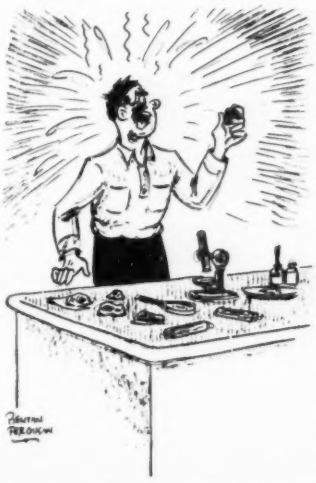
COLLINGWOOD, Ont.—The third in a fleet of the largest fresh-water tankers in the world, the "Imperial Woodbend," was launched here last week following christening by the wife of the federal minister of transport. The tanker is owned by Imperial Oil Co., Ltd.

WASHINGTON. — The Petroleum Administration for Defense is asking the Defense Production Administration for between 2,000,000 and 2,100,000 tons of carbon steel for the second quarter of 1952. Present indications are that the allocation, which is scheduled to be made January 8, will be in the neighborhood of the 1,708,500 tons provided for the first quarter.

Operators' applications for second-quarter allotments are due to be filed with PAD by December 15.

NEW YORK.—Sinclair Refining Co. has purchased the 3,000-hp. twin-screw diesel towboat, "Mattie P. Simpson" and 11 river barges. The boat will be completely overhauled at New Orleans and rechristened the "Sinclair St. Louis." She will go into service in January.

PHOENIX, Ariz.—Stockholders have approved a merger plan for Midwest Oil Co., Mountain Producers Corp., and Saltmount Oil Co. After January 1 all will operate as Midwest Oil Co., Inc. Holdings of the three firms are in 12 states, with the bulk in Texas, Wyoming, Louisiana, New Mexico, and Oklahoma.



"Who put this rock candy in my samples ! ! !"

SOUTHWEST

Committee Formed

Well owners in Spraberry join new engineering group

MIDLAND, Tex.—Owners of more than 75 per cent of Spraberry trend producing wells have signed articles of organization and formed the Spraberry Area Engineering Committee. Arrangements are now being made to set up a permanent committee staff.

Each of the operators in the huge area are eligible to join the committee, upon signing of the articles of the committee and upon payment of their proportional part of the committee's expenses.

J. W. HOUSE

Each operator will have one member on the committee and one vote in its transactions. A permanent advisory subcommittee of 11 members was appointed to serve as a kind of steering committee for the larger body. This subcommittee is headed by the chairman of the larger group, the other 10 members being elected from membership of the main committee for terms of 2 years each.

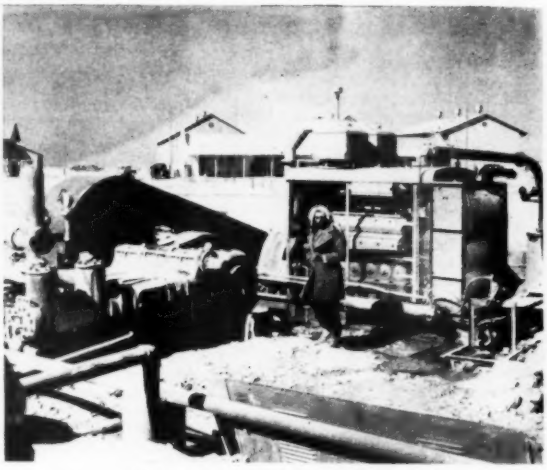
Humble is chairman.—Humble Oil & Refining Co. was elected to the chairmanship of the committee with its West Texas division manager, J. W. House, as representative. The advisory committee will be composed of representatives of Amerada Petroleum Corp., Magnolia Petroleum Co., Phillips Petroleum Co., Sohio Petroleum Co., Stanolind Oil & Gas Co., Cabot Carbon Co., Republic Natural Gas Co., American Republics Corp., Sharples Oil Corp., and Murphy Corp.

Ted Weiner was elected vice chairman of the main committee, and Atlantic Refining Co. was elected secretary-treasurer.

Of an estimated total of 627 Spraberry producing wells, 481 were represented at the meeting, 11 more than the 75 per cent required by the articles for the formation of the area engineering committee.

Staff not selected. — A permanent staff, yet to be selected by the committee, will collect, compile, copy, and disseminate factual reports and correspondence of the committee. This permanent staff will be salaried, the money being furnished by member companies.

Crew rigging up for No. 10, Zubair field.



Mud-mixing equipment, Zubair field.

MIDDLE EAST

Basra's Zubair Field

Successful development program will enable company to begin crude exports in January; pipe line being laid

Dahl M. Duff

BASRA, Iraq.—Active development of Zubair field over the last 3 years by Basra Petroleum Co., Ltd., will result in the first commercial export of crude oil from the concession in early January.

Zubair is currently one of the most interesting operations in the Middle East. The production is the deepest, and the pressures the highest of the Persian Gulf. The pay zone is sand as in Burgan field in Kuwait.

The Zubair development has been carried out by Basra Petroleum, which is an associated member of the Iraq Petroleum Co., Ltd., group. The 74-mile pipe line now nearing completion to a point near the mouth of the Shatt-el-Arab River is being built by I.P.C.'s pipe-line department but its operation will be by the Basra company.

The beginning of commercial export of oil in January at an initial rate of about 25,000 bbl. daily will be 9 months ahead of the export deadline specified in the concession agreement. The recently negotiated concession revision now awaiting approval of the Iraq Parliament calls for 8,000,000 tons a year (about 165,000 bbl. daily) production by 1955. This means further expansion of the facilities, and present plans are for a 24-in. parallel pipe line with two more jetties at the tanker-loading terminal.

Discovered in 1949.—Gravity and seismograph work was done in the Zubair area in 1945-47. The discovery well was spudded February 14, 1948, and completed March 22 the following year at a total depth of 11,171 ft. Ten wells have now been completed at a depth of from 10,800 to 11,200 ft.

Before the discovery well was completed, the company began drilling 10 miles southeast on the No. 2 well. The second well proved the existence of the field in this direction. Subsequent drilling has been with the aim of developing production, and the eight following wells were completed on a 1¼-mile triangular spacing pattern in the vicinity of No. 1.

Six rigs active.—Six National 100 rigs are now being used in the field. One of these rigs is on a workover of No. 1. The drilling program may be stepped up even further with two more rigs next year. Plans call for 15 wells in the area of No. 1, all of which will be served by the central separator station now under construction.

Foundation is now being prepared for Zubair 17 near the No. 2 step-out in what is known as the Rafidiya sector of the field. Another group of 15 wells will be drilled in this area and served by a second degassing station. In addition, a location has been made for a semiexploratory well 10 miles north of No. 1 in the Hammar Lake area. This well was to be spudded early this month.

Drilling time.—Drilling time for the approximately 11,000-ft. wells averages about 150 days, and two wells per rig can be normally completed each year. The casing program is 850 ft. of 16-in., 2,750 ft. of 11¾-in., 8,000 ft. of 8⅝-in., and 5½-in. to total depth.

The degassing station now being built employs the horizontally inclined vessels which are conventional in the Middle East.

As a temporary measure, a single, one-stage separator has been erected in the field for the initial crude production which began the latter part of October to fill the pipe line.

Pipe-line outlet.—The 74-mile pipe line which will provide the field outlet extends to a tanker-loading jetty built on the Shatt-el-Arab at Fao, Iraq. Fao is about 12 miles upstream from the Rooka Channel maintained by the Iraq Government and through which ships pass between the Persian Gulf and the river ports at Abadan, Fao, and Basra.

The pipe line is 12-in. except for the last 10 miles on the Fao end which is 16-in. It extends southeast from the field to the edge of the cultivated area along the river. It then runs south to Fao keeping up to 3 miles west of the river on government land and away from the cultivated strip.

The main pump station is being built at Zubair. It will use gas from

Wellhead installation on discovery well, Zubair field.

Section of Zubair-Fao pipe line which will handle crude.

the separator to operate four National steam pumps, S-335. Temporarily, three National C-350 mud pumps driven by Paxman diesels will be used on the pipe line.

Three 120 by 40-ft. floating-roof suction tanks are under construction at the pump station. These are due for completion in late December, but until the permanent pumps are ready, crude will be drawn directly from the two smaller flow tanks.

Cleaning of the pipe line and checking of pressures on the pipe line began in October. Final testing of wells was carried out at the same time. During November and December, the temporary pumps will be used to fill the line and the storage at Fao.

Capacity.—Line pressure will be from 700 to 750 psi., and the system will be able to move 15,000 tons daily, or roughly about 105,000 bbl. The line has a drop of only 7 ft. in elevation all the way from Mile 15 near Basra to Fao.

Small-gage surface lines in the Middle East are normally laid in wide snaking bends. The Zubair-Fao line, however, was placed on sleepers and is designed to take a sag and uplift with expansion in a horizontal plane.

These concrete sleepers are 8 ft. long, 12 in. wide and 12 in. high. The bottom is serrated for gripping, and is placed slightly below the surface. The steel stirrups are provided on top to prevent any slight side movement up to 2 in. They were also useful in handling the sleepers.

Smaller line risky.—Engineers in charge of the Fao project consider that it would be running some degree of risk to lay a line smaller than 12-in. in the Middle East without the wide snaking flat bends. Experience with the Fao line indicates the method is quite satisfactory with the 12-in. provided the line is kept loaded. The Fao line was filled with water pending operation of the system. For the loaded line, the range of temperature will vary from about 80° minimum up to 112° in the summer.

Final tie-in, welds of the 1-mile sections of pipe after they had been placed on the sleepers, were made between 3 and 8 a.m. The pipe was laid in July and August, and only 2-mile tie-in welds were made daily. About 10 weeks were required to lay the entire 74 miles. It was tested to 1,080 psi. hydraulic pressure.

Terminal facilities.—The Fao terminal provides eight tanks each of 19,000 tons or 135,000 bbl. capacity. Construction of these is expected to be completed in November.

There are two jetties, placed so that there will be 250 ft. between a 500-ft. tanker berthed at each. The approach is 160 ft. to the jetty head. The depth at low water is 34 ft., sufficient for the tankers which can be brought through the channel near the river's mouth.

Four 75-hp. eight-stage vertical-spindle loading pumps are provided at the terminal, each serving two of the eight storage tanks. They provide capacity to load 1,200 tons an hour to each jetty. A 12-in. loading line extends through the center of the tank farm. Suction and loading lines are 24-in.

Corrosion protection.—Thus far there has been only slight corrosion on the pipe line. The question of using cathodic protection on the line, jetty, and auxiliary works, or painting, or doing both, is under study.

One problem encountered at the Fao terminal and along the pipe line is that of floods. During the winter and fall, the low bottom land is often covered with water from the river overflow after rains. A 6-ft. earthen embankment has been placed entirely around the terminal area, and individual pumping units are on raised foundations. Similar embankments 3 or 4 ft. high protect the pipe line from Fao to a point about 15 miles north. These are about 25 ft. clear of the line on either side.

Why A.I.O.C. Foots Bill

Anglo-Iranian Oil Co., Ltd., has explained why it is still paying the expenses of a number of Iranian students at British universities.

A company statement pointed out that the company is required under its terms of its 1933 concession to make a yearly grant allowing young Iranians to study oil-industry subjects in Britain.

Furthermore, the company said, the International Court of Justice last July in its interim ruling on the nationalization issue declared that neither side should do anything to hinder the operations or to aggravate or extend the dispute.

Consequently the 35 Iranians now in Britain studying such subjects as engineering and geology continue at company expenses. They are due to return to Iran next month on completion of their 4-year courses.

The Iranian Government has expelled all company staff from the country, taken over its property, and refers to Anglo-Iranian as the "former oil company." The fact that the government did not call its students home last April would indicate the Iranian officials still concede the existence of the company at least outside of Iran.

Trouble Besets Iran

Two nationalization-board members resign; rioting breaks out in Teheran; bank suspends opening of imports credits

FIVE developments in Iran furnished fresh evidence last week of the serious problems besetting that country as a result of its nationalization of Anglo-Iranian Oil Co., Ltd.

... **Rioting** broke out in Teheran in which several thousand Communists fought a pitched battle with police and supporters of Prime Minister Mossadegh's National Front.

... **Resignations** were handed in by 2 of the 11 members of the parliamentary oil-nationalization board which has been used to give legislative approval to government actions.

... **Opening of credits** abroad for imports into Iran were suspended by the National Bank of Iran.

... **Expulsion** of one of the two American newspaper reporters still in Iran was ordered by the government for alleged insults to the government.

... **Sanctuary** was taken by 32 opposition deputies and newspaper editors in the parliament building in Teheran as protection against pro-government terriorists.

Meanwhile, the National Iranian Oil Co. at Abadan shut down Bench 70, the single distillation unit which was started up November 2 and has been producing about 86,000 bbl. daily.

It has been recognized all along that the unit would have to be idled again unless export shipments could be resumed. Since the unit was producing well above the domestic Iranian demand of about 17,500 bbl. daily, available storage has been again filled.

The national company said one of the smaller distillation units would be used in the future to meet internal consumption requirements.

The Iranian parliamentary oil board recommended to the government last week that former oil buyers be given one more month to exercise their priority rights as purchasers. If they still fail to act, the Iranian Government says it then will sell oil to other countries, including eastern Europe's Communist bloc.

The riots December 6 resulted in the death of at least five persons and were described as the most serious since last June when 20 persons were killed in street fighting in the Iranian capital.

Last week's riots started at Teheran University and later in the day grew into a Communist-led march in defiance of a government ban on political demonstrations. Anti-Communist civilians backed up police in the pitched battle that followed. Later, extremist groups of the National Front broke into and smashed offices of newspapers and political factions opposed to Dr. Mossadegh's government.

Following their usual policy, the Communists in the country are taking every advantage of the increasing internal difficulties and unrest caused by doubts over the course taken by the government and financial problems from the lack of oil revenue.

Disorder blamed.—The two members of the parliamentary board who resigned were senators. One of them, Abolghassem Najm, said in Teheran that the oil industry must be efficient and not like other government departments which are ruled by "anarchy and disorder." In the past, this parliamentary board has given almost automatic approval to the Mossadegh's policies.

Hussein Makki, secretary of the oil nationalization board and a vociferous foe of the British oil industry, declared that the two senators were not serving higher interests of their country by interfering with the functioning of the board. Najm replied that it was not up to Makki to determine what action was in the best interests of Iran.

Bad financial position.—The action of the National Bank of Iran in restricting foreign exchange points to grave concern among the country's financial leaders over Iran's credit position. The curtailment of exchange was described as temporary and was said to have been taken by the bank as a precautionary measure.

The move was immediately reflected in the exchange rate for the Iranian rial. Overnight it dropped from 60 to 65 rials per United States dollar. Importers were notified that applications for opening credits abroad would be taken again in about a week but only for such essential goods as industrial replacement parts and farm equipment.

Iran formerly received about half its revenue from Anglo-Iranian, and, with this gone, the government has drawn heavily on the country's reserves. This is the way in which the former Anglo-Iranian employes at Abadan have been paid. Iran has borrowed $8,750,000 from the International Monetary Fund and has pledged its entire gold deposit with the agency as security.

Reporter expelled.—The American reporter expelled was Michael Clark, New York Times correspondent. He was ordered to leave within 48 hours. Only other American reporter remaining in Iran is Philip Clarke, representing the Associated Press. Last May, the Iranian Government expelled two British newspapermen on similar grounds of abusing the government.

Hussein Fatemi, Iranian deputy prime minister, objected particularly to reports made by Clarke to the effect that Prime Minister Mossadegh's recent vote of confidence was obtained partly through use of terrorist tactics.

The New York Times and several other New York newspapers recently published as advertisements the full text of the annual report of Anglo-Iranian Oil Co. Fatemi said the fact that the Times published this advertisement and received about $4,000 for it showed that the newspaper is on the side of the company. The deputy prime minister of Iran also accused the New York Times representative of being an "agent of Anglo-Iranian."

In the prevailing state of hysteria in Teheran, the charge of being an agent of Anglo-Iranian has been one means of intimidating the opposition. The United States ambassador protested the expulsion, but Dr. Mossadegh refused to reconsider the decision

The 32 deputies and editors who took refuge in the parliament building in Teheran drafted an appeal to the United Nations declaring that Mossadegh's government had violated their fundamental rights. Sanctuary is traditionally given in the parliament building to politicians threatened by violence. The group charged that Dr. Mossadegh's government engineered last week's riots to crush remaining opposition to his regime.

Communist customers.—There were further indications last week that Iran is ready to sell oil to the Communist bloc in Eastern Europe in its desperation to give some degree of success to the nationalized industry.

From Belgrade, Yugoslavia, came a report that the Iranian Government is seeking to interest the Yugoslavs in buying products. The official newspaper of the Yugoslav Communist party published an advertisement from the Iranian National Oil Co. offering products to anyone who could take them away in his own tankers. The Iranian company also said it would pay the cost of transportation from the Persian Gulf to the port of unloading.

The more thoughtful Iranians, particularly those with any knowledge of the oil industry, recognize the difficulties the country faces in making its nationalized industry work. M. Bazargan, chairman of the provisional board of directors of the National Iranian Oil Co., told his countrymen last week that the industry could not survive as a lone wolf and that it must eventually be tied into the world oil industry on a high-production basis.

The complete impasse now existing between Iran and Britain was documented last week with the publication by the British Government of a

white paper giving the text of all exchanges between Britain and Iran over the oil issue. The British Government paper charged that Iran gave in to organized demonstrations in nationalizing the British-owned industry and also that it had withheld from the Iranian public the information that the company had offered to make a 50-50 profit-sharing arrangement with the government.

Agreement to Parliament

The new 50-50 profits-participation agreement between the Iraq Government and Iraq Petroleum Co., Ltd., will be submitted to the parliament in Baghdad when it reconvenes early next month.

The agreement *(The Oil and Gas Journal, August 23, 1951, page 105)*, has been submitted to Premier Nuri Al Said following study by a legal committee. Under its terms and planned future levels of production, Iraq's revenue from the company will reach the equivalent of about $165,000,000 in 1955.

There is some nationalistic pressure against the government in opposition to the agreement, but it is generally felt that, considering Premier Nuri Said's influence, the chances are that it will be ratified.

LATIN AMERICA

New Oil Law?

Brazilian president seeks legislation creating agency which would nationalize operating end of oil industry

THE first official disclosure that the Vargas administration in Brazil is backing an even more restrictive and nationalistic petroleum policy came last week.

President Getulio Vargas sent a message to the congress in Rio de Janeiro proposing legislation which would create a half-billion-dollar oil agency in which the government would hold 51 per cent of the stock.

The new organization, to be known as Petroleo Brazileno, would nationalize the operating end of the industry, eliminating what private enterprise still exists in the refining field. The head of the new agency would be a native Brazilian appointed by the president.

In his message, President Vargas said that "the Brazilian Government and people want foreign cooperation and initiative in the country's economic development but prefer to reserve the oil industry to national initiative." He also said it is well known that the "monopolistic tendencies of the international petroleum industry" create friction between the government and the people.

There had been earlier indications that such a proposal was in the offing on the part of the Vargas administration but the amount of money set for its capitalization seemed surprisingly high and beyond the country's requirements. Vargas, who ruled Brazil as virtual dictator for 15 years after 1932, was reelected last year by a large plurality and inaugurated in January to succeed former President Dutra.

Philosophy revealed. — During his campaign, President Vargas revealed his philosophy regarding petroleum with statements declaring he favored private enterprise except for cases where the interests of national defense and sovereignity required control by national capital.

All exploration and production in Brazil has been carried out through the government National Petroleum Council, while refining is done by the council and several private Brazilian companies. Two new medium-capacity plants have been recently projected by private Brazilian interests.

Limited to marketing. — Foreign-oil interests in Brazil are now limited to marketing. This is an important activity since Brazilian demand amounts to more than 100,000 bbl. daily of which the government's domestic production meets only 2,000 bbl. daily.

Principal company marketing in Brazil is Standard Oil Co. of Brazil (Standard Oil Co. [N.J.]). Others with major marketing interests are Shell and The Texas Co. While the Vargas proposal apparently does not threaten these properties directly, it is obvious that the development of a large-scale government refining industry, even if not backed up by domestic production, could easily lead to government competition in the marketing operations.

Door not closed.—The Brazilian Constitution of 1946 which is now effective does not completely close the door on foreign participation in the development of Brazil's oil. However, the necessary enabling legislation to allow the entry of foreign capital was never enacted. The new proposal of the Vargas administration appears to be the government plan for oil legislation under the constitution.

The subject of foreign participation in Brazil's oil has been a source of controversy for years. Standard Oil of Brazil has made it plain it is ready to take part if favorable legislation were provided. However, the other international oil companies generally require managerial control of their operations with at least 50 per cent interest. It is not clear if the 49 per cent not held by the government in Vargas' proposed agency could be taken by foreign oil companies, but their participation on this minority basis is not likely.

Recovery Boosted

Forest Reserve repressure project termed successful

REPRESSURING has improved recovery prospects of Forest Reserve, the principal field of Trinidad Leaseholds, Ltd., in Trinidad, and a third such project is to be placed in operation in the field as soon as the necessary equipment is received.

Simon J. Vos, T.L.L. chairman, in his statement accompanying the company's report for the year ended June 30, said that production from Forest Reserve continues to be controlled in the interests of good operating and conservation practices. More pumping equipment enabled production from the company's smaller fields in Trinidad to be maintained, and in Palo Seco field of the subsidiary Siparia Trinidad Oilfields, Ltd., production has been increased materially due to an active drilling program.

Cretaceous test. — During the year, Vos reported, T.L.L. drilled a well to 14,018 ft. to ascertain the possibilities of the Cretaceous in the Morne Diablo properties of the Siparia company. This well, Vos said, represented a remarkable technical achievement in being drilled to just over 12,500 ft. with only 2,000 ft. of casing.

Though oil production was not obtained, thick porous sands of the same Cretaceous age as those yielding major production in western Venezuela were discovered. In consequence, another well is being drilled on the Marac structure, where it is expected that the same sands will be found at shallower depth.

Reserve position.—The company's reserve position was maintained during the year despite withdrawals by normal development work which allowed reserves to be transferred from the probable and possible to the proved category. Two additional wells wer drilled in the recently discovered Clarke Road area, Vos reported, and though a substantial body of light oil was proved, the denseness of the sand so far has prevented satisfactory rates of production except in the discovery which has made 200,000 bbl. and is still flowing.

During the year, the company produced 6,100,500 bbl. of crude against 6,255,700 bbl. the previous year ended

June 30, 1950. Crude oil purchased and received from joint fields and other sources amounted to 13,268,700 bbl. against 11,378,700 bbl. the previous year. The company refined 17,680,600 bbl. of crude for its own account against 16,116,100 bbl. the previous year.

Vos said the project for modernization of T.L.L.'s refinery in Trinidad is proceeding as well as can be expected under present conditions of slow delivery of materials. Work on alterations to the existing plant is well in hand. The 8 per cent increase in throughput achieved during the year was made possible partly by bringing new tankage into use. More tankage is to be completed by the end of 1951.

Canadian operations.—The chairman noted that the company's Canadian subsidiary has completed the acquisition of the assets of Canada West Drilling Co. He said the examination of other propositions is actively proceeding with the view of acquiring production which will satisfy requirements for this Canadian market area.

Trinidad Northern Areas, Ltd., in which T.L.L. is equal partners with Shell and Anglo-Iranian Oil Co., Ltd., completed drilling and testing of a Cretaceous exploratory well in the central-range area, but the operation was unsuccessful.

It is planned that the geophysical survey of the company's marine concessions in the Gulf of Paria will be carried out with the view of locating submarine structures suitable for marine drilling.

Regarding marketing, Vos said that the year had seen an interesting development in the sale of gasoline through dealers in the United Kingdom. This is the development of exclusive representation whereby the dealer resells to the public gasoline supplied by one company only. In the Caribbean, he said, the company's marketing continues to expand through its subsidiary and associated companies.

Sulfur Plant Under Way

Petroleos Mexicanos is reported to be constructing a 6,000,000-peso project at the Atzcapotzalco refinery for the desulfurization of gasoline and recovery of elemental sulfur.

The treating unit will handle 10,000 to 20,000 bbl. of gasoline per day. Capacity of the sulfur-recovery facilities was not announced.

The Atzcapotzalco refinery, located near Mexico City, has a crude capacity for 39,500 bbl. per day. The refinery area is being extended by 42 hectares (about 100 acres) to care for the centralization of all petroleum product shipping and distribution facilities in the Federal District.

The new sulfur-recovery unit will be the second for Pemex. A 130-ton per day unit located in the Poza Rica field and operated by General Chemical Division of Allied Chemical & Dye, is in operation, recovering sulfur for fertilizer manufacture. The plant recovers sulfur from hydrogen sulfide, which comprises 4 per cent of the 150,000,000 cu. ft. of natural gas processed at the field-processing plant.

EUROPE

Capacity Being Increased

The new 28,000-bbl. daily refinery of Anglo-Iranian Oil Co., Ltd., and Petrofina at Antwerp, Belgium, began production in September, but already its capacity is being increased to 40,000 bbl. daily.

This project is the latest of a number of major refinery-expansion and construction plans announced over the last few months by Anglo-Iranian. It shows the speed with which the capacity lost at Abadan is being replaced.

The expansion of the Antwerp refinery is being carried out in order to meet the urgent needs of markets in the Benelux countries and Switzerland, Anglo-Iranian said. Additional specialist training of Belgium oil technicians for Antwerp is being undertaken at A.I.O.C. refineries outside Belgium.

The operating company for the Antwerp refinery is Soc. Industrielle des Petroles. First construction on the plant began in the summer of 1949. The original refinery cost the equivalent of about $28,000,000.

Austrian Oil Line Studied

The Soviet oil administration is reported to be studying the possibility of laying a crude-oil line from the Lower Austrian fields of Zistersdorf and Matzen to Czechoslovakia. The plan calls for processing the oil in existing refineries in Moravia and Slovakia.

Soviet development of production in Austria in the last few years has been the most noteworthy oil development in Eastern Europe. Little is known about the operations, except for occasional fires and blowouts.

The latest of these was reported the latter part of November and was said to have completely destroyed two derricks in Zistersdorf when a well went out of control.

ASIA

Caltex Considers Refinery

California Texas Oil Co., Ltd., is considering the construction of a refinery in India, but it will be some time before a decision is made.

The Indian Government announced late in November that Standard Vacuum had signed an agreement to build a 19,000-bbl. daily Indian refinery and indicated that similar agreements would be made in the near future with the other two principal marketing companies, Caltex and Burmah-Shell.

The Standard-Vacuum project was confirmed by the company in New York. Burmah-Shell has a delegation in India which is reported to be definitely discussing a similar project with the government. Caltex said it is studying the situation but emphasized that no definite discussion of any kind has yet taken place.

New Ethiopian Test Planned

Sinclair Oil Corp. has announced its operating subsidiary in Ethiopia, Sinclair Petroleum Co., has selected a site for a second test well.

The location is near the village of Galadi in Ogaden Province, about 45 miles east of the first nonproductive test. A crew is now being recruited in the United States with drilling slated to start early next year.

International Briefs

The production potential of the new Macuspana area of Mexico is increasing so rapidly that Petroleos Mexicanos is considering the early construction of a pipe line from the field to the Minatitlan refinery in the State of Tabasco, according to a report from Mexico City. Although exploration and drilling is being extended in the area, several of the wells have been capped for lack of transportation for the oil. The Macuspana crude has no sulfur content, according to Pemex officials.

New oil production has been found by French operators at Staffel Felden in eastern France, according to reports from Paris. The apparent discovery was reported to have tested 2,000 l. (about 12½ bbl.) an hour of good-quality oil.

Pakistan Petroleum's test well at Sui (Dera Bugti) in Baluchistan has reached a depth of 1,029 ft. Pakistan Petroleum, a Burmah Oil Co., Ltd., affiliate, spudded in the test October 10 and set 16-in. casing at 439 ft. The well, located in an uninhabited sandy desert, is slated to be taken to a maximum of 10,000 ft.

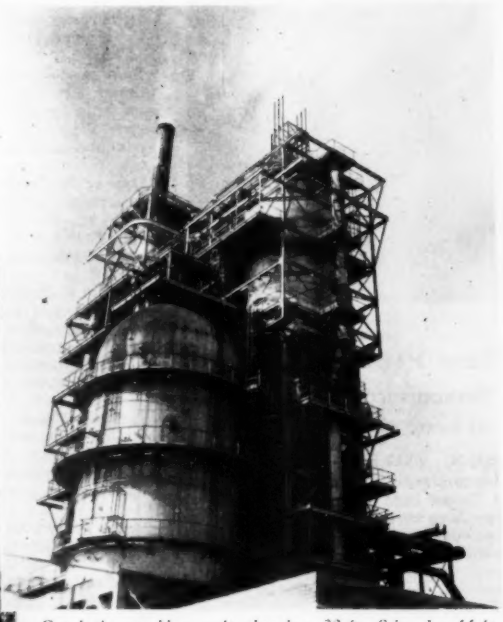
Construction work has started on a new 114-mile pipe line for light products from the Magdalena River port of Puerto Berrio to the Colombian industrial center of Medellin. The line is being laid by Carolina Constructors.

HORTON PROCESSING EQUIPMENT

MEETING THE CHALLENGE OF INCREASED PRODUCTION

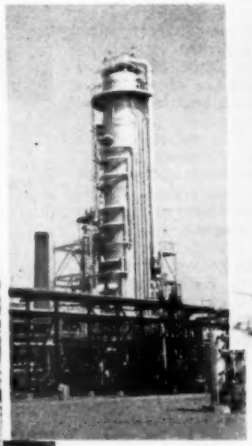
For years, Horton processing equipment has helped the petroleum industry keep pace with the ever growing demand for its products. Now, when the record of higher and higher productivity is receiving its greatest test—Horton equipment is still meeting the challenge.

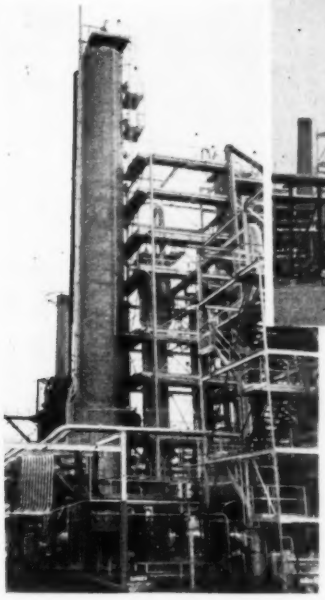
These Horton units were erected to help *double* the capacity of a large midwest refinery. Each was carefully engineered and fabricated to meet exacting specifications embodying the most modern refinery principles, to assure accurate, efficient petroleum processing. Write for information and quotations.



Catalytic cracking unit showing 30-ft. 8-in. by 44-ft. regenerator and 26-ft. and 23-ft. 6-in. by 43-ft. reactor.

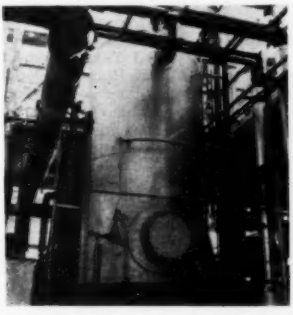
15-ft. diam. by 90-ft. vacuum tower built by Chicago Bridge and Iron Company.





12-ft. diam. by 120-ft. extractor tower installed in the furfural extraction unit. It was shipped all in one piece from our Chicago plant and weighed 100 tons.

6-ft. diam. by 19-ft. 4-in. absorber gas knockout drum. It was designed for a working pressure of 190 lbs. per sq. in. and random x-rayed at our Chicago plant.



CHICAGO BRIDGE & IRON COMPANY

Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PENNSYLVANIA

Atlanta, 3.....2154 Healey Bldg.
Birmingham, 1.....1536 North 50th St.
Boston, 10.....1025—201 Devonshire St.
Chicago, 4.....2128 McCormick Bldg.
Cleveland, 15.....2204 Guildhall Bldg.
Detroit, 26.....1514 Lafayette Bldg.
Houston, 2.....2119 National Standard Bldg.
Los Angeles, 17.....1523 General Petroleum Bldg.
New York, 6.....3347—165 Broadway Bldg.
Philadelphia, 3.....1615—1700 Walnut Street Bldg.
Salt Lake City, 4.....525 West 17th South St.
San Francisco, 4.....1554—200 Bush St.
Seattle, 1.....1325 Henry Bldg.
Tulsa, 3.....1606 Hunt Bldg.
Washington 6, D. C.....1139 Cafritz Bldg.

REPRESENTATIVES AND LICENSEES

Horton Steel Works, Limited, Fort Erie, Ontario, Canada
Ateliers et Chantiers de la Seine Maritime, Paris, France
Constructions Metalliques de Provence, Arles-sur-Rhone, France
Chicago Bridge & Iron Company, Ltd., Apartado 1348, Caracas, Venezuela
Sociedade Chibridge de Construcoes Ltda., Av. Franklin Roosevelt, 194-S/704-C, Rio de Janeiro, Brazil
Comprimo N.V., Amsterdam—O, Netherlands
Compagnia Tecnica Industrie Petroli, Rome, Italy
Whessoe, Limited, Darlington, England
Motherwell Bridge & Engineering Company, Limited, Motherwell, Scotland

PERSONALS

New President

Emison succeeds McLaughlin as head of Texas Pipe Line

JOHN WILLIAM EMISON, vice president and general manager of Texas Pipe Line Co. and Texas-New Mexico Pipe Line Co., has been elected president of both firms succeeding R. B. McLaughlin, who has been elected to the newly created position of chairman of the board. The change is effective January 1.

Emison was born on a farm near Higginsville, Mo., graduated from grade and high schools in Higginsville, and attended the University of Missouri for 2 years.

In 1920 he joined Texas Pipe Line as a clerk in the Houston general office, was named chief accountant in 1929, and was appointed assistant secretary of the firm in 1930.

In 1935 he was named assistant treasurer, and in 1939 he was elected treasurer of Texas Pipe Line and Texas-New Mexico Pipe Line. In 1945 he became vice president and treasurer of the two firms.

He was elected vice president and assistant general manager of both companies and vice president of Texas-Empire Pipe Line Co. and Kaw Pipe Line Co. in 1947.

J. T. Rynd, vice president and assistant general manager of Texas Pipe Line Co. and Texas-New Mexico Pipe Line Co., has been promoted to vice president and general manager of both firms succeeding **J. W. Emison,** who becomes president of the two companies on January 1. **L. F. Scherer,** assistant general manager (construction and engineering) was elected a director, and **S. C. Kershner,** assistant general manager of Texas-New Mexico Pipe Line, has been promoted to vice president. In The Texas-Empire organization, **O. A. Newport,** assistant general manager, will become vice president and assistant general manager and **C. H. Albitz,** manager of the oil-traffic division, will become assistant general manager of operations.

Rom E. Rosenberger, production foreman for Trigood Oil Co., has been transferred from East Teapot Dome, Wyo., to Sterling, Colo., as production and drilling foreman.

Harvey R. Comby, formerly petroleum engineer with U. S. Bureau of Mines at Bartlesville, Okla., has joined Bell Oil & Gas Co. at Burkburnett, Tex., as production engineer.

William B. Belknap, formerly reservoir engineer with Cities Service Oil Co. at Bartlesville, Okla., has joined Phillips Petroleum Co. at Ardmore, Okla., as production engineer of the Ardmore district.

Jack R. Fraser, formerly production geologist for Shell Oil Co. at Oklahoma City, has joined Texas-Eastern Production Corp. at Houston as production geologist.

Harry Ptasynski, geologist for Pure Oil Co. at Wichita, Kans., has been promoted to district geologist and transferred to Amarillo, Tex.

Paul R. LeDoux, tool pusher for Montgomery Drilling Co., has been transferred from Delhi, La., to El Dorado, Ark.

Edward I. Blincoe, engineer for Sohio Petroleum Co., has been transferred from Houston to Midland, Tex.

W. D. McIntyre, general superintendent for Danciger Oil Co. at Houston, has resigned and joined Southern Production Co. at Fort Worth in the same capacity.

Paul D. Sweitzer, petroleum trainee for The Texas Co. at Jal, N. M., has been promoted to petroleum engineer and transferred to Sundown, Tex.

R. F. Higginbotham, superintendent for Sinclair Oil & Gas Co., has been transferred from Corpus Christi to Columbus, Tex.

Bart W. Gillespie, long-time international oil man, has joined British American Oil Co., Ltd., and will make his headquarters in Calgary, Alta., Canada. He has been engaged in consulting work in Mexico and formerly was employed in that country as general manager of Mexican American Independent Oil Co.

Carl A. Benson, engineer for Phillips Petroleum Co. at Bartlesville, Okla., has been transferred to Big Spring, Tex., and promoted to assistant district superintendent.

H. R. Wall, assistant superintendent of Continental Oil Co.'s Ponca City, Okla., refinery, has been promoted to superintendent. **L. D. Grubb,** director of technical services for Cit-Con Oil Corp., Lake Charles, La., has been named assistant superintendent of the Ponca City refinery, succeeding Wall. Wall succeeds **C. D. Hull,** who has been promoted to the newly created position of manager of the Ponca City refinery. Wall joined Conoco in 1935, was named superintendent of the Lake Charles, La., refinery in 1948, and became assistant superintendent at the firm's largest refinery, in Ponca City, in 1950. Grubb joined the firm in 1939 and was transferred to the Cit-Con refinery at Lake Charles in 1947 as director of technical services.

H. R. WALL

L. D. GRUBB

N. W. Engel, formerly geologist at Evansville, Ind., for Superior Oil Co., has transferred to Denver as district geologist.

Lee R. Tatum, Cities Service Oil Co. geologist, has been transferred from Lewiston, Mont., to Olney, Ill.

James T. Dorland, engineer-geologist, has joined the staff of Calvert Drilling Co., Inc., at Olney, Ill.

Rudolph R. Enck, chief proration analyst for the Texas Railroad Commission since 1941, has been named assistant director of production in the gas division.

Robert G. Behrman has been elected president of the newly organized Gulf Coast Leaseholds, Inc., at Houston. The firm, a Delaware corporation, is a subsidiary of Manabi Exploration Co., Inc., and will operate the company's holdings in the State of Texas. Other officers include: **Cecil V. Hagen,** chairman of the board of directors; **John K. Williams,** vice president; **Perry G. Pye,** secretary-treasurer; and **W. R. Kerr,** assistant secretary-treasurer.

PERSONALS

Richard J. Sanders, geologist for Continental Oil Co., has been transferred from Salt Lake City to Bakersfield, Calif.

Frank C. Barnes, formerly with the New Mexico Oil Commission, has resigned to do consulting work. Headquarters will be in Santa Fe, N. M.

J. B. Chamberlain, assistant district manager for Houston Natural Gas Co. at Texas City, Tex., has been transferred to Wharton, Tex., as district manager. **L. J. Lucas,** who recently transferred to Wharton from East Bernard, Tex., as district manager, has returned to East Bernard as plant manager.

Henry M. Noel, petroleum processing specialist, has retired from his position as staff advisor in Standard Oil Development Co.'s Esso laboratories to accept a confidential assignment with the Petroleum Administration for Defense. The nature of his new assignment required complete severance of his relations with Standard following 30 years of service with various Jersey Standard companies.

Henry Schiffbauer, of Tide Water Associated Oil Co., has been named zone supervisor of the mechanical department at the Bayonne, N. J., refinery.

Harry L. Pelzer, manager of the newly organized Sinclair Research Laboratories, Inc., has been elected a director. Pelzer joined the Sinclair organization in 1919 at the East Chicago refinery. He was appointed manager of the butadiene plant of Sinclair Rubber, Inc., at Houston in 1942, and upon completion of the firm's laboratories he was transferred to Harvey, Ill., and in 1951 named to his present position.

Fred Miller has been elected secretary and director of Bonanza Oil & Mine Corp., and **Leon C. Stanley** has been elected a director.

Homer G. Moore, formerly senior geologist in charge of south Louisiana and Mississippi for Pan American Production Co., has joined Louisiana Land & Exploration Co. as chief geologist.

Dr. C. M. Blair, assistant superintendent in charge of production and shipment of all synthetic organic chemicals for Carbide & Carbon Chemical Co., at Texas City, Tex., has been named chairman-elect of the Southwest Texas section of the American Chemical Society. Other officers include: **M. C. Hopkins,** Pan American Refining Co., Texas City, alternate councilor; **A. E. Richey,** Industrial Scientific Corp., Houston, secretary; **A. D. Henson,** Eastern States Refining Co., treasurer; **S. S. Shaffer,** Humble Oil & Refining Co., Baytown, Tex., councilor; **O. K. High,** Carbide & Carbon; **W. H. Lane,** Monsanto Chemical Co.; **Simon Miron,** Pan American Refining; and **C. H. Beckworth,** Rohm & Haas, Houston, directors.

Guy W. Goodman, formerly with General Petroleum Corp. at Fresno, Calif., has joined Pacific Gas & Electric Co. at Needles, Calif., as a compressor engineer.

T. L. Scott, engineer for Phillips Petroleum Co., has been transferred from Odessa, Tex., to Bartlesville, Okla.

G. R. Henson, exploration manager for Southern Production Co., has been elected the first president of the Baton Rouge Geological Society, a new organization. Other new officers include: Vice president, **John E. McDougal,** Southern Production district geologist; secretary, State Geologist **Leo Hough;** treasurer, **Thomas Morgan Winfiele,** Louisiana Conservation Department chief engineer; and two executive committeemen, **C. J. Bonnecarrere,** secretary of the Louisiana Mineral Board, and **John G. Harris,** of Sinclair Oil Co.'s land department.

W. B. STROBEL

W. B. Strobel, senior engineer in the process division of Continental Oil Co.'s manufacturing department at Ponca City, Okla., has been promoted to the newly created position of technical assistant to **Dr. John E. Kircher,** Houston, manager of the company's petrochemical department. Strobel will move to Houston where he will make his headquarters.

Donald M. Davis, exploration manager in the Gulf Coast division in Houston for Pure Oil Co., and **Karl A. Mygdal,** chief of the development geological section in Chicago, have been named to the newly created posts of assistants to the exploration manager. The appointments are effective January 1. Both men will be located in the firm's headquarters at Chicago.

George F. Getty, II, has been named division manager of Pacific Western Oil Corp.'s new West Texas-New Mexico division with headquarters in Midland, Tex. Other appointments in the new Midland office include: **J. T. Gist,** exploration manager, and **Douglas F. Edman,** division land man.

William A. Grubb, formerly chemical engineer for Gulf Oil Corp. at Philadelphia, has joined California-Texas Oil Co. in New York City in the same capacity.

Daniel Marken, partner in Marken-Granel Drilling Co., has moved from Wichita, Kans., to Casper, Wyo.

Dr. William Arthur Gruse, administrative fellow of the petroleum-refining fellowship at Mellon Institute, has been named to receive the Pittsburgh Award for outstanding service to chemistry. The work of his fellowship, sustained by Gulf Research & Development Co., has resulted in basic improvement in the refining of gasoline, lubricating oil, waxes and essentially all petroleum products.

Dr. James H. Gardner, formerly technologist for Shell Oil Co. at Deer Park, Tex., and lecturer in the chemical-engineering department at the University of Houston, has joined the petrochemical-research department of National Research Corp. at Cambridge, Mass.

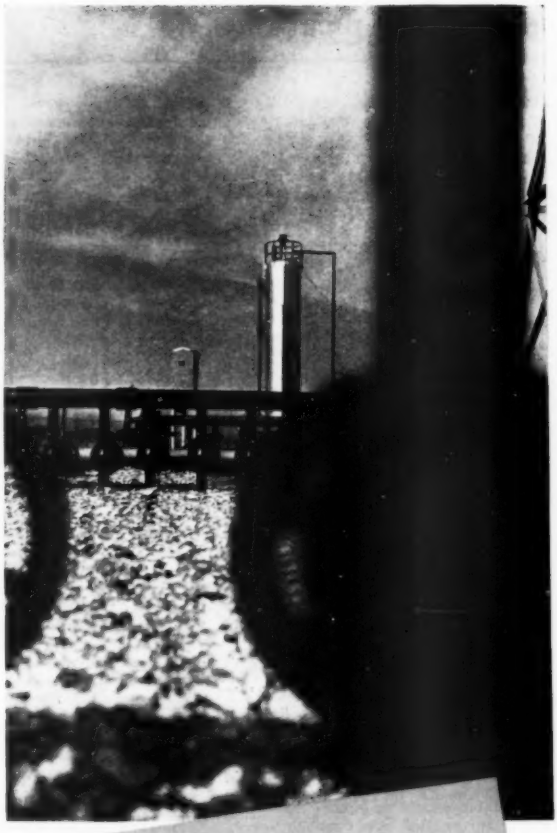
Paul A. Kindsvater, field superintendent in charge of East Texas fields for British-American Oil Producing Co. with headquarters in Selman City, Tex., has been promoted to district superintendent of the newly created West Texas district with offices located in Midland, Tex.

Ernest Appel, geologist and computer for Midwestern Geophysical Laboratories at Miles City, Mont., has resigned and joined Sinclair Oil & Gas Co. at Billings, Mont., as geologist.

H. O. Stallings, petroleum engineer for Magnolia Petroleum Co. at Seminole, Tex., has resigned and joined Richardson & Bass at Kermit, Tex., in the same capacity.

T. H. Marshall, a director of Anderson-Prichard Oil Corp., Oklahoma City, has been reelected president of the Kansas-Oklahoma division of the Mid-Continent Oil and Gas Association. Other officers elected were: **Villard Martin,** Tulsa, first vice president; **W. G. Tierney,** Derby Oil Co., Wichita, vice president for western Kansas; **Carl Weiner,** Chanute, Kans., vice president for eastern Kansas; **A. W. Ambrose,** Cities Service Oil Co., Bartlesville, Okla., vice president for northern Oklahoma; **Ward S. Merrick,** Ardmore, Okla., vice president for

WHERE *Visco* TREATMENT PAYS OFF



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PERSONALS

southern Oklahoma; and **Dean A. McGee,** Kerr-McGee Oil Industries, Inc., Oklahoma City, vice president for western Oklahoma. **Clarel B. Mapes** was reelected secretary and treasurer.

J. Spencer Winn, engineer trainee for Continental Oil Co. at Lance Creek, Wyo., has been transferred to Ponca City, Okla., as petroleum engineer trainee.

W. N. Graburn, of Calgary, Alta., Canada, has been elected a director and an executive officer of Pacific Petroleums, Ltd.

A. C. Austin, formerly geologist-geophysicist for Tide Water Associated Oil Co. at Saskatoon, Sask., Canada., has joined Ohio Oil Co. at Tulsa in the same capacity.

Fred A. Norris, former district engineer for British-American Oil Producing Co. at Seymour, Tex., has been promoted to superintendent of the central district, filling the vacancy created by the death of J. C. Bruce. Norris has been with B-A since 1944, having been district engineer in Oklahoma City from 1946 until his transfer to Seymour in 1950.

William P. Young, Jr., has been transferred from Graham to Abilene, Tex., and promoted to junior production engineer for Warren Oil Corp.

J. G. Blevins, Jr., petroleum engineer for The Texas Co. at Sundown, Tex., has been transferred to Hobbs, N. M., and promoted to field foreman in charge of drilling and production.

J. A. McCutchin, district manager of exploration for Bay Petroleum Co. at Abilene, Tex., has resigned and joined Whitehall Canadian Oils at Calgary, Alta., Canada, as general manager.

Harry D. Vaughn, of Lane-Wells Co., Corpus Christi, Tex., has been elected chairman of the Southwest Texas section, petroleum branch of the American Institute of Mining and Metallurgical Engineers for 1952. Other officers include: **Barrett Boothe,** Houston Oil Co. of Texas, Beeville, vice chairman; and **Joe B. Woodward,** Seaboard Oil Co. of Delaware, Corpus Christi, secretary-treasurer. Directors elected include: **Charles Barnes,** Texas Acidizers, Beeville; **Don F. Shaw,** Humble Oil & Refining Co.; **R. E. Bates,** Sun Oil Co.; **R. B. Sale,** Seaboard; **R. J. Granberry,** Core Laboratories, all of Corpus Christi; **J. T. May,** The Chicago Corp., Agua Dulce, Tex.; **W. J. Turner,** of Sun Oil Co., McAllen, Tex., and **T. E. Keefer,** Stanolind Oil & Gas Co., Bishop, Tex.

Harry R. Hostetter, independent core-drilling contractor, has moved his headquarters from Florence, Colo., to Tustin, Calif.

J. M. Hughes, tool pusher for Delany Drilling Co., has been transferred from Chandler to Perkins, Okla.

Lee Conroe, who has been representing **D. D. Feldman,** Dallas independent oil operator, in Midland, Tex., for the past 2 years, has moved to the firm's headquarters office in Dallas.

J. H. McKeever, geologist for Stanolind Oil & Gas Co., has been transferred from Calgary, Alta., Canada, to Billings, Mont., in the same capacity.

G. J. SMITH

E. V. HEWITT

G. J. Smith, superintendent of the exploration department for Pan American Production Co., and **E. V. Hewitt,** general superintendent, have been elected vice presidents of the firm. **A. W. Lott,** administrative assistant, has been elected assistant secretary of both Pan American Production and Pan American Gas Co. Smith started his oil career with The California Co. in 1925 and after varying lengths of service with other major oil firms, joined Pan American in 1936 as a geologist. Hewitt joined Michigan Petroleum Corp. in 1921 and Pan American in 1935 as a field foreman. **Ben H. Martin,** West Texas district geologist at Abilene, Tex., has been transferred to Houston as superintendent of the exploration department succeeding Smith. **John L. Hoyt, Jr.,** assistant general superintendent, has been promoted to general superintendent succeeding Hewitt. **Duval A. Davidson, Jr.,** superintendent of the Valley district with headquarters in Willamar field, Willacy County, Texas, has been promoted to assistant general superintendent with headquarters in Houston. **William B. Rodan,** geologist in the Abilene, Tex., office, has been promoted to senior geologist and will be in charge of West Texas geological activities, retaining his headquarters at Abilene.

Frank A. Stivers will retire January 1 from connections with pipe-line affiliates of The Texas Co. In recent years he has been vice president, director, and general manager of Texas Empire Pipe Line Co. and Kaw Pipe Line Co., and vice president, director, and assistant general manager of Texas Pipe Line Co. and Texas-New Mexico Pipe Line Co. He will continue to maintain residence in Tulsa.

I. B. Tietze has been appointed general superintendent of the crude-oil pipe-line division of Phillips Pipe Line Co., subsidiary of Phillips Petroleum Co. Tietze continues as assistant to **W. H. Wallace,** vice president of Phillips Pipe Line.

R. H. C. Harrison has been named president of the Western Canada Petroleum Association. Harrison formerly was western manager of crude-oil purchasing for British American Oil Co., Ltd., vice president of Alberta Pipe Line Co., and vice president of Saskatchewan Pipe Line Co.

Robert A. Ratliff, process engineer for Continental Oil Co. at Ponca City, Okla., has been transferred to Lake Charles, La., and promoted to process supervisor.

E. E. Pyles, vice president of Jergins Oil Co., has been elected a director of the firm. He is a former president of Southwest Exploration Co.

Oscar John Dorwin, general counsel for The Texas Co., has been elected a vice president. Three other vice presidents elected last week include: **A. N. Lilley,** general manager of foreign operations in the Eastern Hemisphere; **James H. Pipkin** promoted from general manager of industrial and public relations to vice president in charge of that department; and **A. M. Ottignon,** assistant to the president. Ottignon will head the newly created supply and distribution department.

Edmond L. d'Ouville has been appointed division director of research in the Standard Oil Co. (Ind.) research department at Whiting, Ind., where he will be responsible for information and patent activities. He will also continue as senior technologist of the development and patent department in the firm's general office at Chicago.

Herbert Willetts, general manager of Socony-Vacuum Oil Co., Inc.'s domestic marketing, has been elected to the board of directors. **Albert L. Nickerson,** for the past 5 years director in charge of the firm's marketing, has been appointed vice president and will be the director in charge of the company's foreign operations. He succeeds **Walter L. Faust,** who is relin-

PERSONALS

quishing his heavy responsibilities because of ill health. Faust will continue as a director and vice president until the end of the year.

J. C. Richdale, of Boston, vice president of Esso Standard Oil Co., has been elected to the board of directors of the Transportation Association of America to serve for a 3-year period. Others elected to the board include: **J. L. Burke,** Tulsa, president of Service Pipe Line Co.; and **Charles R. Musgrave,** Bartlesville, Okla., vice president of Phillips Petroleum Co. **F. O. Prior,** executive vice president of Standard Oil Co. (Ind.), has been reelected a director.

Lorne J. Price has been appointed division superintendent of the southern division of Dominion Natural Gas Co., Ltd.

Robert L. Gibson, division engineer for Shell Oil Co. at Corpus Christi, Tex., will sail January 19 for a 6-month assignment at The Hague as exploitation engineer. **J. W. Moore,** division reservoir engineer at Corpus Christi, will fill Gibson's position during his absence.

Lee Cornell, of Franco Central Oil Co., has been elected president of the Kansas Geological Society for 1952. Other new officers include: **William M. Brodrick,** of Anderson-Prichard Oil Corp., vice president; **Brian Kirby,** of Sunray Oil Corp., secretary-treasurer; and **George Reed,** of Nadel & Gussman, new member of the board of directors. **Ralph Ruwwe,** of Stanolind Oil & Gas Co., is the retiring president.

R. C. Armstrong has resigned from the geological department of Skelly Oil Co. in Wichita to become a geological consultant. He has been with Skelly since 1941 except for 3 years spent in the air force.

J. Durwood Pate has been appointed Oklahoma district geologist by Eason Oil Co., Oklahoma City. **Eugene F. Culp** has been appointed junior geologist and **David B. Richardson** has been named vice president in charge of the land and legal department in the Oklahoma City office.

Bryan W. Payne, president of Iowa-Payne Oil Co., Tyler, Tex., has been elected president of the Texas Independent Producers and Royalty Owners Association. He will fill the unexpired term of **Robert L. Foree** who resigned to become director of production of the Petroleum Administration for Defense January 1. Payne is also a member of the executive committee of the Independent Petroleum Association of America.

Harold D. Hammar, district foreman for Trigood Oil Co. at Sterling, Colo., has resigned and joined the Chase National Bank at New York City as petroleum engineer.

W. H. Hopson, Stanolind Oil & Gas Co., has been elected chairman of the Tulsa section of the American Chemical Society. Other officers elected were: **M. O. Denekas,** University of Tulsa, vice chairman; **J. H. McCracken,** Warren Petroleum Corp., secretary; **Walter Young,** Ozark Mahoning Co., treasurer; **F. T. Gardner,** University of Tulsa, councilor; and **Buell O'Connor,** Stanolind, alternate councilor.

John J. Muth, Jr., former petroleum-engineering student at University of Tulsa, is now associated with his father, **John J. Muth,** independent operator.

Dr. Gordon Rittenhouse, former associate professor of geology at University of Cincinnati, has joined the exploration staff of Shell Oil Co. at Tulsa.

W. B. Banks, Jr., mechanical engineer with Shell Oil Co., has been transferred from the firm's New Orleans area to its production division at Hobbs, N. M. Other Shell transfers include: **P. W. Miller, Jr.,** exploitation engineer, from Odessa, Tex., to Hobbs, N. M.; **E. W. Nestor,** exploitation engineer from Hobbs to Midland, Tex.; and **W. G. Inabnet,** formerly district superintendent at Hobbs, has been transferred to the Tulsa area office. **W. T. Weller,** at Midland, has been promoted from junior mechanical engineer to mechanical engineer.

Harry McNeely, of Sycamore, Pa., formerly chief engineer at New York State Natural Gas Corp.'s Preston station, has been promoted to district engineer of the firm's compressor stations in the southern area of Pennsylvania. **Wilbur J. Whitehill,** also of Sycamore, has succeeded McNeely as chief engineer at Preston station.

K. L. Gow, formerly Evansville, Ind., district geologist for Superior Oil Co., is now a partner with **W. E. Bakke,** in Bakke Oil Co. at Houston.

W. L. Richards, engineer for Phillips Petroleum Co., has been transferred to Odessa, Tex., from Andrews, Tex.

C. S. Smith, superintendent of the Wichita, Kans., compressor station for Cities Service Gas Co., has been transferred to Guymon, Okla., as superintendent of gas pipe lines at the gas production and compressor station there.

Louis A. Shore, chemical engineer for Phillips Petroleum Co., has been transferred to Odessa, Tex., from Pauls Valley, Okla.

Sam B. Raitman, of Evansville, Ind., will move to Bismarck, N. D., where he will manage the western activities of the newly formed Sioux Petroleum Co., Inc., of which he is part owner. The new company is owned by Calvert Drilling, Inc., of Olney, Ill., **A. J. Magness, F. W. Mitchell, Noe I. Everett, Howard L. Brockman,** and **J. V. Boxell.**

DEATHS

Leo J. Vance, 50, head of Petroleum Drilling Co., Pawhuska, Okla., died there December 8. He had been in the oil business for 20 years.

Edmund H. Shultz, 61, an oil gager more than 30 years for Humble Oil & Refining Co., died December 5 at Bellville, Tex.

S. Peiser, 80, president of Consolidated Chemical Industries, Inc., died December 3 at San Francisco.

Thomas L. Glover, 53, Mid-Continent drilling superintendent for Kerr-McGee Oil Industries, Inc., Oklahoma City, was killed in an automobile accident December 4.

Roy J. Murray, 61, of Crosby, Tex., died November 21. He was one of the original contractors in Venezuela, having been located in the Maracaibo region for more than 20 years.

Clarence L. Brown, 66, retired official of Sinclair Oil & Gas Co., died December 7 in Tulsa. He had retired in November 1950 as superintendent and manager of the Sinclair gasoline department. He had been with the firm since 1917.

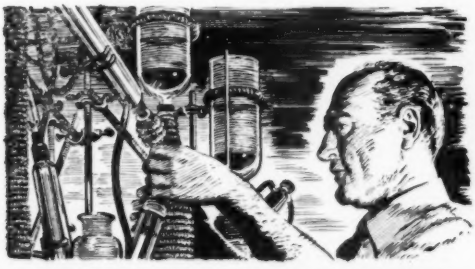
Harold T. Williams, 59, northern division superintendent of General Petroleum Corp.'s pipe line department, died December 1 in Santa Barbara, Calif. He had been with the firm since 1921.

Joseph Clinton Dailey, 63, owner of Dailey Oil Tools, Inc., Channelview, Tex., died December 1.

"What have I got to lose if they break you up?"

Aside from any question of fairness, *people wonder how they'll be affected personally if the Anti-trust lawyers succeed in cutting big companies into smaller ones. We hear such comments as, "What have I got to lose if they break you up?"*

The answer depends on who you are. Most people gain in many ways by the fact that there are both large and small companies competing for your patronage, trying to get ahead. Here's what you stand to lose:



New products and improvements in old ones flow steadily from our laboratories—new gasolines and oils, raw materials for new fabrics, "soapless soaps"; other modern miracles. You may take such progress for granted. But Standard has put some 40 million dollars into research since 1940. We can't go on this way if they break us up.

Motorists get the finest service at Western gas stations; Standard led the way. Our technical counsel helps many industries cut production costs of goods you buy. We've pioneered in taking needed petroleum products into undeveloped farm and frontier areas. We can't give these services if we're forced to be small.

You are assured of ample supplies of petroleum products at reasonable prices. Standard is constantly seeking out new crude oil reserves in this country and abroad. This sometimes costs millions before the first gallon is found. We can do jobs this big, which benefit you as well as the country, only by being integrated.

America's military strength depends heavily on industry. Our fighting men are backed by *the world's greatest* production capacity. Should it now be *limited* by breaking up big companies? We are at work for our Government on atomic research, synthetic rubber, aviation gasolines, other jobs. We believe we perform them *best* by being *big.*

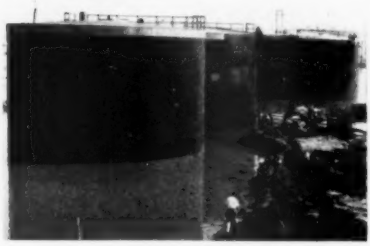
You have a lot to lose if they break us up. As a big, integrated company, Standard is able to operate more efficiently in serving you and helping to make America strong.

STANDARD OIL COMPANY OF CALIFORNIA

• plans ahead to serve you better

CLEARING SITE.—Outmoded refinery equipment was removed to provide 148,000 sq. ft. for the cracking and gas-recovery units.

WATER WAY.—Storage tanks were emptied and floated to new location. Temporary dikes were thrown up and water pumped into the "water-way" enclosures.



How Gulf Oil Built a . . .

63,000-Bbl. Cat Cracker

in less than a year

Contractor erects unit in 358 days, despite steel shortage and other problems encountered during construction

by F. Lawrence Resen
Gulf Coast District Editor

GETTING the world's largest catalytic cracking unit of its type into actual operation in less than a year after initial construction began was no small feat, officials of Gulf Oil Corp.'s Port Arthur, Tex., refinery report.

Not only were many construction problems overcome by the contractor, but a steel shortage had to be contended with. But the job is now complete, and the huge 63,000-bbl. per day unit has made Gulf's refinery one of the largest in the United States. Official starting date on construction was October 4, 1950, and official date

NEXT STEP.—Foundations were installed for catalytic cracking unit. Heavy overriding structures required a high degree of reinforcing in concrete.

STRUCTURES for the reactor and regenerator practically complete.

of acceptance was September 27, 1951, or a total of 358 days.

The refinery, which began operations in 1901, now has more than 4,750 employes.

Gulf Oil's R. C. Faulkner, general superintendent of Texas refineries; T. F. Hogan and G. I. Roberts, assistant general superintendents of Texas refineries; Charles R. Stevenson, plant manager; P. H. Marble, superintendent of construction and repairs activities; and process engineers report that in building the cracker in less than 12 months:

1. An area of 148,800 sq. ft. was cleared entirely of outmoded refinery equipment.

2. Approximately 16,000 45-ft. piles—roughly 130 miles in length—for foundations had been driven and capped with concrete.

3. The cracking unit was erected on the site, tested, and put on stream.

Large sections of the unit were prefabricated and shipped to the plant site for assembly by M. W. Kellogg Co., who designed and built the cracker. The largest and highest single vessel, the regenerator, towers 220 ft. in the air.

Faulkner and the other Gulf officials state that:

1. The unit's throughput is approximately 20 per cent greater than any similar installation currently in operation.

2. It circulates 68 to 70 tons—equal to two railroad cars full—of fluidized catalyst per minute.

3. It charges 47,000 bbl. per day fresh feed and 16,000 bbl. per day of recycle stock to the reactor.

4. Size of Gulf's Port Arthur refinery can be realized when it is considered that there are a total of 2,231 storage tanks holding 14,011,557 bbl.; 343 miles of oil pipe lines; 130 miles of foam lines (for fire protection), and that the entire plant covers a site of 3,949 acres.

Unit performance. — Operation is such that the motor-gasoline output of the refinery has been stepped up approximately 20,000 bbl. per day without any change in crude throughput.

Self-contained. — The cracker is largely a self-contained unit having its own gas-recovery and light-ends-fractionation system and is independent of the rest of the plant, with exception of feed-stock preparation and utilization of end products.

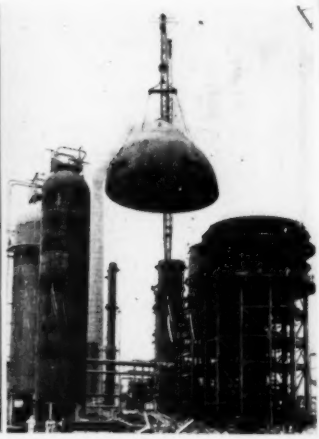
Other facilities.—Supplementary equipment installed by Gulf along with the cat cracker includes two 300,000-lb. per hour boilers, a water-cooling tower, and a copper-sweetening unit to handle additional gasoline output. In addition, Kellogg has just completed a 20,000-bbl. vacuum unit for further reduction of residual stocks from other refinery stills, thus augmenting the feed stock to the cat cracker.

Catalyst.—The fluid catalytic cracking unit consists of catalyst regenerator, reactor, fractionator, and gas-recovery unit, plus auxiliary equipment. Filtrol SR natural-powdered catalyst is currently being used in this unit, the spent catalyst from the reactor being carried by air to the regenerator where coke is burned off and the regenerated catalyst passing through standpipes into carrier lines where it mixes with incoming feed.

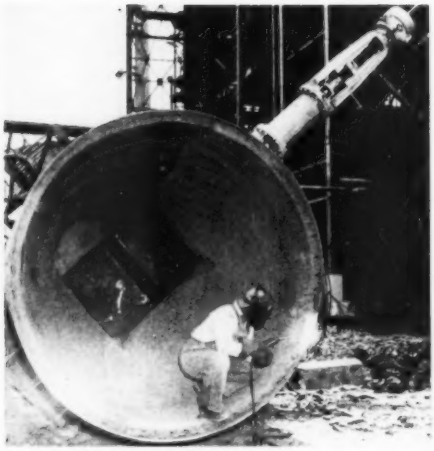
Heat from the regenerated catalyst flash vaporizes the oil and the mixture passes upward into the reactor. Hydrocarbon vapors from the reactor are passed through a fractionator where various cuts are made. Overhead gases from the fractionator are processed in a gas-recovery unit for extraction of gasoline, butane-butene, and propane-propene fractions.

Regenerator design. — The catalyst regenerator is in the shape of a vertical cylinder with cone-shaped sections on either end, so that it roughly resembles a football standing on end. At the topmost portion of the regenerator is the flue-gas stack, while

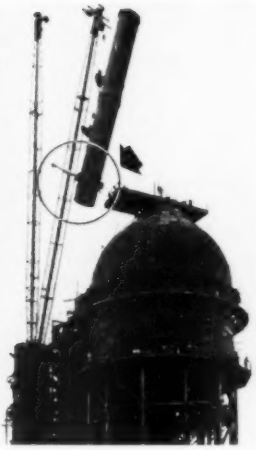
REGENERATOR TOP.—Upper section completed and ready to be lifted. Note size of man.

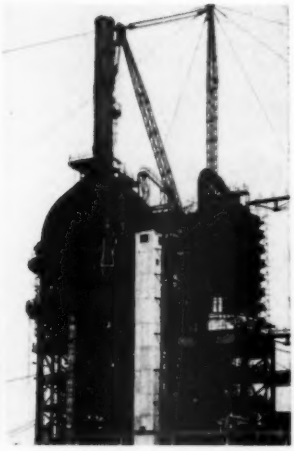


UP SHE GOES.—Crane lifts upper regenerator section to swing it into position.



BEFORE.—Welder working inside portion of 102-in. i.d. regenerator stack. Slide valve holds back pressure on regenerator. Arrow and circle show relative size of this valve as it is being lowered.





AFTER.—Stack now towers 220 ft. above ground. Note elevator shaft between regenerator, left, reactor, right.

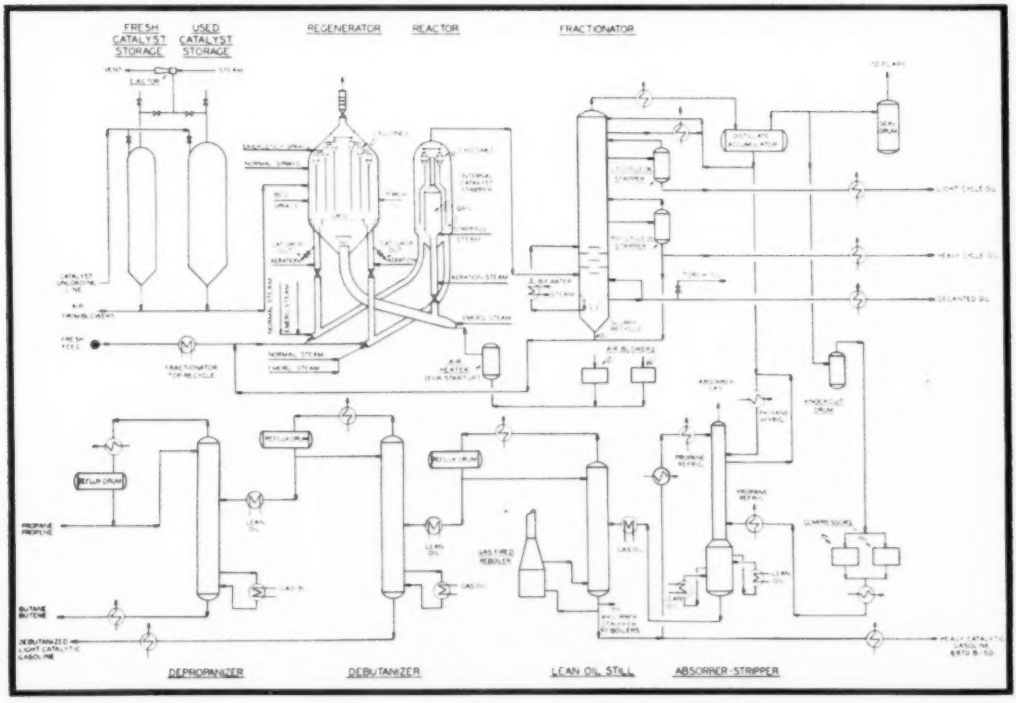
the spent-catalyst carrier line is connected to its lower extremity.

Over-all height of the regenerator is approximately 220 ft. measured from grade level to the top of the flue-gas stack, which, incidentally, has an inside diameter of 102 in. The regenerator has an over-all height of approximately 90 ft. with an internal diameter of 55½ ft. measured from wall lining to wall lining.

Spent catalyst from the carrier line enters the base of the regenerator through a primary distribution system and then passes up through a distributor grid which serves as a support for the burning bed.

The flue gas passes through this catalyst bed to 12 parallel sets of cyclones in the upper section of the regenerator, where catalyst particles

SCHEMATIC FLOW DIAGRAM OF GULF'S FLUID CATALYTIC CRACKING UNIT



are trapped. Each of the cyclones has an individual dip leg for conveying the recovered catalyst back to the bed. These dip legs reach into the bed itself -and rely on its sealing action rather than a trap to maintain a seal. After passing the cyclones, the flue gas passes on into the plenum chamber for discharge through the stack into the atmosphere.

Several perforated dished heads within the stack act as orifice plates for reducing the discharge pressure of the flue gas and for absorbing noise. A further pressure drop is achieved in the flue gas passing the back pressure slide valves located at the base of the stack. Two of these slide valves are mounted diametrically opposed to each other. The one for normal operation is hydraulically operated while the second has manual controls for standby operation.

Burning rate. — The regenerator is designed to consume 40,700 lb. of coke per hour at a temperature of 1,100° F. Air design equivalent of 516,000 lb. per hour is provided by two centrifugal compressors with individual outputs of 64,600 cu. ft. per minute at a temperature of 100° F.

ESTIMATED MATERIAL BALANCE—WEST TEXAS WIDE CUT GAS OIL

(Processed over Equilibrium Filtrol SR Catalyst at 930° F.)

Stream—	Per cent	BPSD	°A.P.I.	Lb./hr.
Fresh feed	100.0	47,000	30.0	600,100
Heavy recycle	32.6	15,325	23.0	204,520
Slurry recycle	2.5	1,175	15.0	16,540
Totals	135.1	63,500	28.2	821,160
Dry gas (FOE)	4.6	2,162		27,380
Propane-propene	6.0	2,820		21,150
Butane-butenes	12.0	5,640		49,110
C_5—400° F. end-point gaso.	46.5	21,855	56.0	240,300
Light cycle	31.0	14,570	28.0	188,380
Decanted oil	5.0	2,350	15.0	33,080
Coke (90% C)	*6.8			40,700

*Weight.

REACTOR OVERHEAD QUANTITIES

	Lb./hr.
Hydrocarbon vapors	780,460
Inerts	12,630
Steam	42,510
Total	835,600
Catalyst*	5,300
Total	840,900

*This 5,300 lb. per hour of catalyst returns to the reactor via the slurry recycle stream.

The majority of this air is used as carrier for the spent catalyst and for burning of the coke. In the burning process, 561,000 lb. per hour of flue gas leaves the stack.

Boiler feed water is fed into the regenerator for control of temperature. Twelve normal sprays are mounted above the catalyst bed to control final flue-gas temperature. Twelve additional sprays are mounted at this point and four sprays are located in the catalyst bed to take care of emergency conditions.

Catalyst control.—Regenerated-catalyst flow is controlled by slide valves located at the bottom of the two standpipes. Catalyst dropouts are included in these standpipes for removal of catalyst on shutdown and sample dropouts are provided for collecting analytical samples of the equilibrium catalyst.

The standpipes meet the carrier lines to the reactor at a center-line point just above grade. Here the hot catalyst comes into contact with the incoming feed stock which flashes to vapor. The flash vaporization plus the injection of steam fluidizes the catalyst which is carried upward into the reactor where cracking takes

(Continued on page 104)

GULF MEN AT CRACKER STARTUP

GULF OIL CORP.'s new catalytic cracking unit at Port Arthur went on stream in October, and present for the occasion were a great many of the refinery's 4,780 employes.

Among company officials shown here who attended the "on-stream" ceremonies were Sidney A. Swensrud, president; R. C. Faulkner, general superintendent of Texas refineries; T. F. Hogan and G. I. Roberts, assistant general superintendents of Texas refineries; Charles R. Stevenson, plant manager at Port Arthur; and P. H. Marble, superintendent of construction and repairs activities.

During his speech to employes, Swensrud revealed plans for construction of a 60-ton per day sulfur-recovery unit at the refinery which will utilize hydrogen sulfide from refinery waste gases as feed for extraction.

The sulfur-recovery plant, Swensrud reported, will be built by Ralph M. Parsons Co., Los Angeles. It will use sulfur in producing enough sulfuric acid to make 360,000 gal. per day of alkylate.

Eight refineries.—Gulf has eight refineries, of which Port Arthur is the largest. Other plants and their capacities include the following:

Sweetwater, Tex., 8,000 bbl.; Fort Worth, 9,500 bbl.; Toledo, 40,000 bbl.; Cincinnati (Cleves), 30,000 bbl.; Staten Island, N. Y., 20,000 bbl.; Philadelphia, 107,000 bbl.; and Pittsburgh (Neville Island), 14,000 bbl.

SIDNEY A. SWENSRUD
President, Gulf Oil Corp.

R. C. FAULKNER
Gen. Supt., Texas Refineries

T. F. HOGAN
Asst. Gen. Supt., Tex. Ref.

G. I. ROBERTS
Asst. Gen. Supt., Tex. Ref.

CHARLES R. STEVENSON
Port Arthur Plant Mgr.

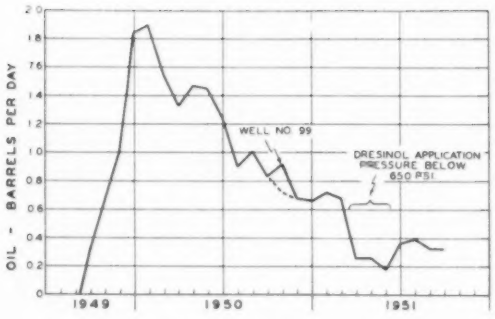


Fig. 1—Oil production of test five-spot.

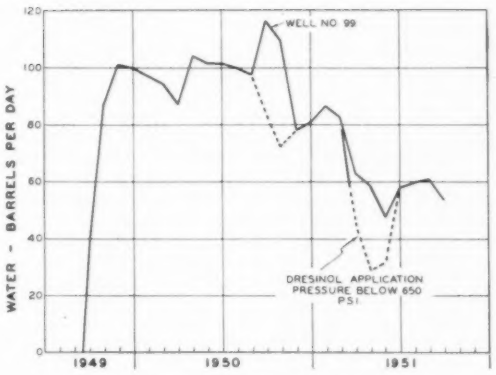


Fig. 2—Water production of test five-spot.

FIELD DATA ON

Operation of Orco Process

near Richburg, N. Y.

by James W. Martin*

Field tests on Knight farm of Bradley Producing Corp. result in increased oil and gas production by injection of carbon dioxide and plain water

THE Knight farm, a Bradley Producing Corp. property due west of Richburg, N. Y., was chosen the location for the initial field test of the Orco process. This spot was considered to have the most desirable characteristics for a test of this nature because:

1. The sand is thick and characteristic of this area.

2. The property has a prolific production history which indicated high residual-oil saturations after water flooding.

3. The property has been subjected to a continuous water flood for about 15 years and is considered "watered out" even below its economic limit.

4. Two almost new wells were available for a half-acre test five-spot and two sets of cores had been recently taken.

5. The area is easily accessible by a good paved road running through the property.

The data given here are compiled from the records kept during the test period. When in this report, interpretations of the test data are given, they represent those views in which there is substantial concurrence among the observers of the test and test data. This group of 11 engineers included the engineers of 2 oil-producing companies and representatives of 2 independent firms of reservoir engineers. The statements regarding the phenomena observed during the test are based on work done in part by the above groups, and by an independent research laboratory with a considerable background in the oil industry.

Wells on the lease on which the test was made had been pumped for many years but within the last year or two, prior to the test, oil production had diminished to a point where pumping was no longer profitable and the wells were flowed. Water was injected at from 600 to 1,000 psi. top-hole pressure. Wells within a radius of 400 ft. surrounding the test area, approximately 8 acres containing eight wells, showed a production rate for the period of flowing, just prior to the test, of approximately 740 bbl. per year, or 92 bbl. per well per year.

The test area was a five-spot consisting of four injection wells and a centrally located production well. The area of the five-spot was approximately 0.45 acre and the distance between injection wells and production well was about 100 ft. The sand is about 42 ft. in thickness, varies in air permeability from 1 to 98 md. (average 14 md.), has an average porosity of 15 per cent, and an average oil saturation of 33 per cent. Depth of sand was below 1,100 ft. and bottom-hole pressure of producer was 400 to 500 psi.

On September 12, 1949, carbon dioxide injection was begun. This carbon dioxide was obtained from pressure cylinders in which dry ice had been placed and permitted to sublime into carbon dioxide gas or melt into liquid carbon dioxide. Inasmuch as the sand near the injection well was known to contain sufficient water and oil readily to dissolve the amount of carbon dioxide injected, the greater part of the carbon dioxide was injected continuously for 21 days. In the latter stages of the injection, however, carbon dioxide was injected during the daylight hours and water was injected at night. This procedure continued for 34 days. The total amount of carbon dioxide injected was 369.6 tons. Under existing conditions approximately one-fourth, or 92 tons, should have entered the 0.45-acre test area.

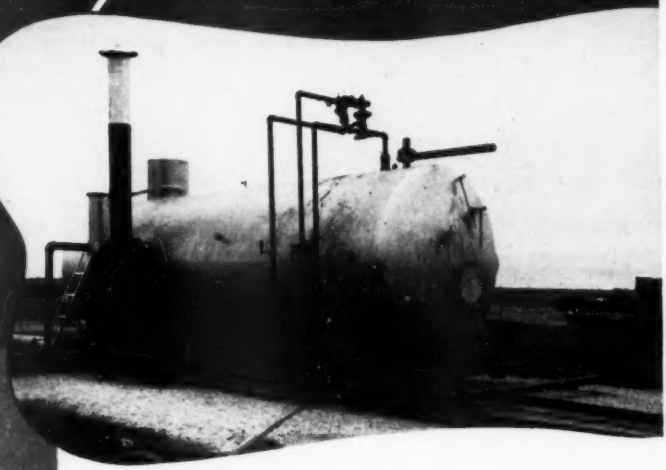
Following the injection of carbon dioxide, plain water was introduced into the four injection wells at around 1,000 psi. This injection of water was continued during the 2 years of the test.

Charts showing the monthly production data for the 2-year period of September 1949 to September 1951 have been prepared and cover the following steps:

Oil production.—Fig. 1 indicates that the production well drilled in an area that had normally been producing about ¼ bbl. of oil per day had, within 1 month after the start of carbon dioxide injection, surpassed this average oil production. Within 4 months it had reached a peak 5-day average production of 2.57 bbl. per day and from this peak the production has declined in the characteristic water-flood decline curve to a production in September 1951 of 0.35 bbl. Because of the short spacing of injection and production wells the decline curve is much foreshortened. The total amount of oil obtained from the producing well during the first 2 years of the test was 637 bbl.

*Vice president, Engineering, Oil Recovery Corp., New York. Paper presented at sixth annual meeting, Pittsburgh section, A.I.M.E., William Penn Hotel, Pittsburgh, Nov. 2, 1951.

There's a Maloney-Crawford Treater to Handle *Every Emulsion Problem*



This Model M-825-E Is Successfully Operating On A Water Flooding Project in Oklahoma

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DIRECT-HEATERS
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DEHYDRATION UNITS

Maloney-Crawford pioneered the horizontal treater to bring the industry the advantages of portability, elimination of the problem and cost of upending a treater, ease of operation and maintenance due to ground level accessibility of treater and controls.

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Water production.—This rose sharply during the first 2 months of the test period and then tended to level off for almost a year. (See Fig. 2.) Since that time water production has declined and is, at the end of the 2-year period, less than one-half of the peak production.

Water-production data are erratic during the second year due, in part, to an attempt to selectively plug off some of the more permeable strata which were found to have been carrying a large share of the water throughput.

Water-oil ratio.—Initially between 120 and 130, this has declined in inverse proportion to the production of oil (see Fig. 3). The water-oil ratio reached a monthly average of 51 within 4 months after the injection of the carbon dioxide had started and then increased. The plot in Fig. 3 is also erratic during the period in which attempts at selective plugging were being made. During most of the test period the water-oil ratio was lower than what it was at the beginning or at the end of the test.

Production of total gas.—This (both carbon dioxide and hydrocarbon gases) rose to a peak at about 3 months subsequent to the peak of production of oil and from this peak has declined rapidly as indicated by Fig. 4. At the peak there were approximately 3,650 cu. ft. per day, and at the end of the 2 years of the test period there was being produced 360 cu. ft. per day. The concentration of carbon dioxide also rose rapidly to 90 per cent in January 1950 and remained about constant for 6 months. Since June of 1950 the concentration has declined until in September of 1951 the produced gas is about 60 per cent carbon dioxide.

Production of carbon dioxide.—Fig.

DATA FROM WELL 98 TAKEN ABOUT 10 MONTHS AFTER START OF ORCO PROCESS

Zone Nos.	Net feet of sand	Avg. perm.	Residual oil	Production*		Water-oil ratio
				CO_2†	Oil	
1	10.5	36.5	25	Trace	Trace	‡1,000:1
2	10.2	9.8	25	4 cu. ft./day	010 B/ft. day	137:1
3	12.5	10.8	35	7 cu. ft./day	015 B/ft. day	51:1
4	8.5	8.5	32	2 cu. ft./day	024 B/ft. day	62:1

*Given in cubic feet and barrels per foot of sand per day. †CO_2 is total gas production times per cent CO_2 in this gas. ‡Approximate.

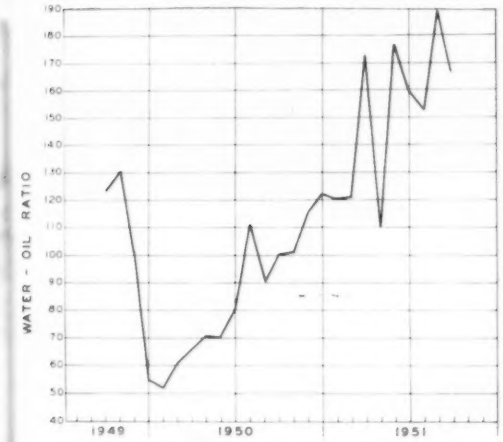


Fig. 3—Produced water-oil ratio. Well 98.

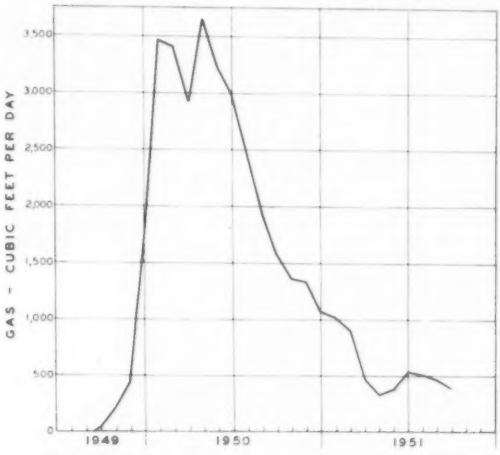


Fig. 4—Estimated production of total gas, test five-spot.

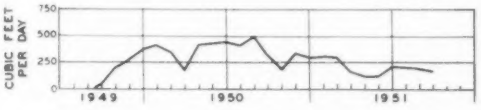


Fig. 6—Estimated production of natural gas, test five-spot.

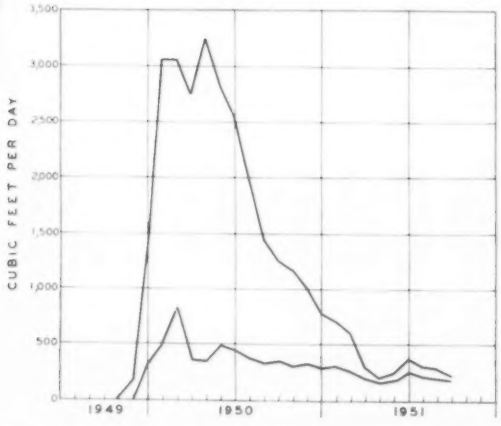


Fig. 5—Estimated production of total CO_2 gas and CO_2 gas carried in solution, test five-spot.

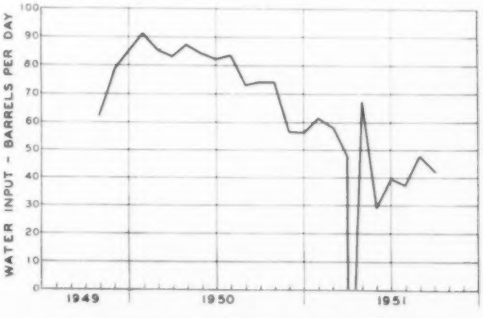
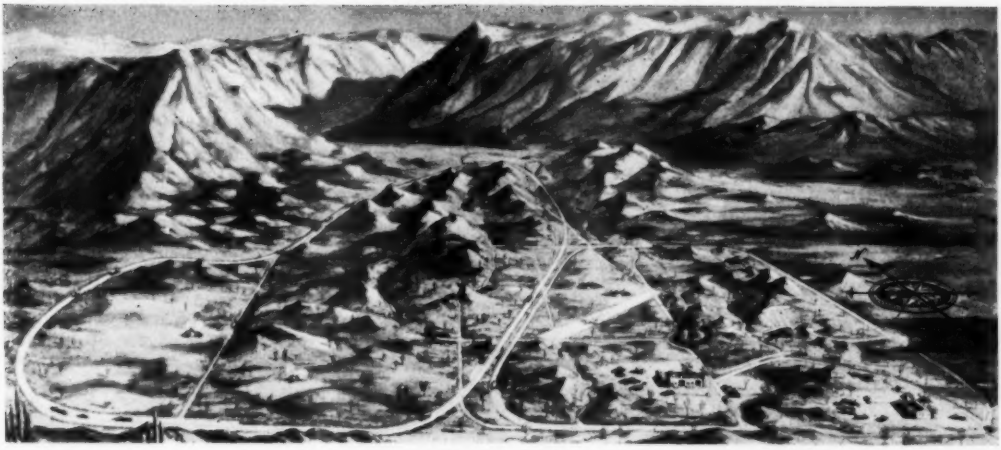


Fig. 7—Average water intake per well, test five-spot.



Even the buzzards need sunglasses as they wheel over the 6½ square mile hot box that is the Phoenix Proving Ground of International Trucks. Here, Internationals are put through a rugged grind as they roll round a 7¼-mile paved test track, on a 24-hour-a-day, 34,000-mile-a-week schedule. A 4-mile dirt test track and 11 miles of success roads help provide rugged approximation of every highway condition your truck may meet. Arizona test fleet mileage now totals over 5,000,000 miles.

Desert Whipping Post

Our Phoenix Proving Ground is a whopping whipping post built to help answer this question:

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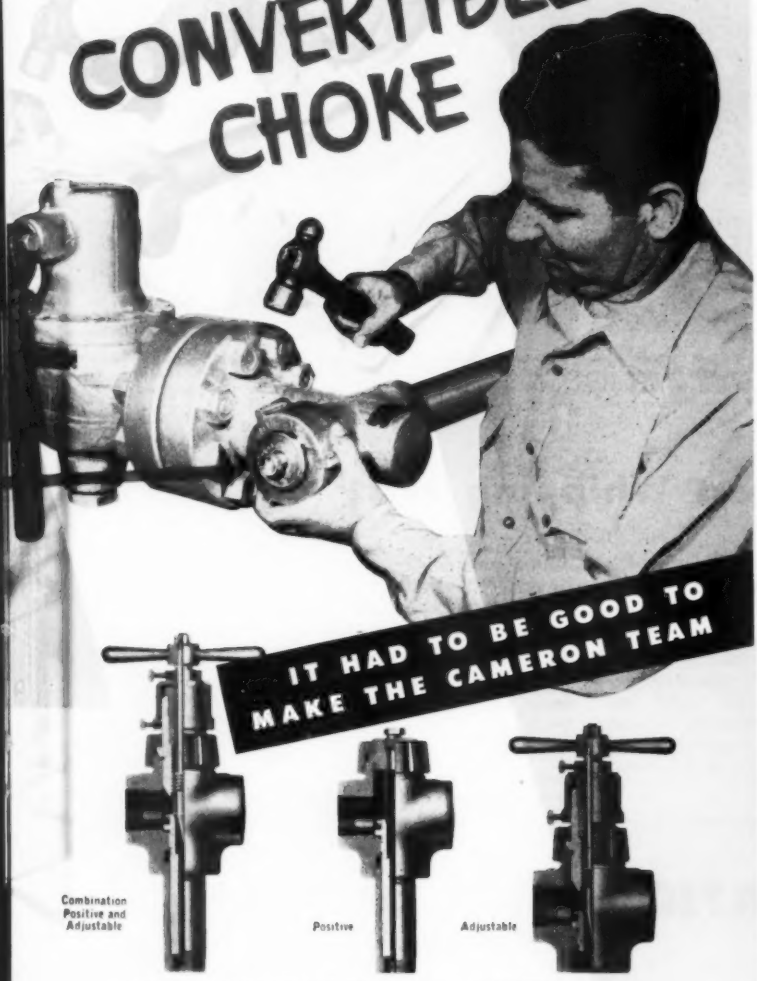
Up "The Nine" (a 9% grade that forces drivers to test gear ranges), climb units of the International Truck test fleet on their constant circling of the test track.

CAMERON 3-WAY CONVERTIBLE CHOKE



IT HAD TO BE GOOD TO MAKE THE CAMERON TEAM

The Cameron Type "H" Production Choke may be converted to any of three types, utilizing a single choke body: Positive, Adjustable, or Combination Positive and Adjustable.

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5 indicates the carbon dioxide started to emerge with the oil and water from the producing well within 6 weeks after injection of carbon dioxide was started. The production increased rapidly until April of 1950 when a monthly average production of 3,250 cu. ft. per day was reached. From this peak of production the volume of carbon dioxide has dropped until at the end of the 2-year period it was about 210 cu. ft. per day.

Also it can be seen from Fig. 5 that a relatively small amount of carbon dioxide remained in the water even after it emerged from the production well.

The total carbon dioxide produced during the 2 years of the test amounted to about 65 tons. All of this was suitable for reuse.

Production of natural gas.—Along with the carbon dioxide there was produced a substantial amount of hydrocarbon gases. The production of hydrocarbon gases rose to a peak 7 months later than the peak of oil production and 4 months later than the peak of carbon dioxide production. Having reached the monthly average production of approximately 500 cu. ft. per day in August 1950, it has, by September 1, 1951, declined to approximately 150 cu. ft. per day (see Fig. 6).

Water injectivity.—From Fig. 7, showing the average water intake per well, it can be seen that although well-head pressure remained constant over most of the period, the average water injection rose from approximately 60 bbl. per day to a peak of 90 bbl. per day. This peak corresponded approximately with the peak of oil production. Injectivity of the wells remained well above the initial injectivity for the greater part of the test period, but at the end of the period had declined to around 40 bbl. per day. During the latter part of this period injectivity was substantially modified by the injection of a selective plugging agent.

During the early part of August 1950, just prior to the middle of the test period, an observation well (Well No. 99) was drilled halfway between one of the water-input wells and the production well. This well was drilled (but not shot) and was tested by stages through the oil sand. Data obtained from this observation well are summarized in the accompanying table.

From the table it would appear that the carbon dioxide at this time had completed its action on the upper 10 ft. of sand (Zone 1). This assumption is based on the high permeability of the sand in this section coupled with the absence of carbon dioxide and the lack of any additional oil production. The other three zones (2, 3, and 4) show various stages of progress in the passage of the carbon dioxide.

The significance of some of the production data obtained may be summarized as follows:

1. In an area that had previously been producing at a rate of 92 bbl. per well per year, there has been produced, in 1 year, 470 bbl. of oil and in 2 years, 637 bbl. On a per acre basis these figures are 92, 1,045, and 1,410 bbl. of oil respectively.

2. The amount of carbon dioxide that entered the test-area five-spot was estimated at 92 tons. When allowance has been made for certain known leakage, the net amount of carbon dioxide that actually entered the test area was probably less than 80 tons. This amount of carbon dioxide would be sufficient to have saturated between 10 and 15 per cent of the water and oil in the oil sand within the test area. When the radial flow pattern is considered this probably means that the total liquids of the oil sand were carbonated to between 10 and 15 per cent of their full carbon dioxide saturation point.

The proportion of gas to liquids in the produced fluids was at no time greater than that required to only partially saturate the liquids. The conclusion is warranted that all gas in the oil sand was in solution in the liquids and was released in the producing well. None passed through the sand in the gas phase.

3. Within the 2 years of the test period approximately 65 tons of carbon dioxide (say 80 per cent of that injected) has been recovered in a condition suitable for recycling.

4. In a careful analysis made by some of the reservoir engineers who had followed this test it was concluded that after considering the amount of carbon dioxide used and deducting the amount of oil production that could be attributed to the increased water throughput, there still was an oil production almost double what could have been brought about by increase in formation volume. They reported that the additional recovery obtained in this test of the process cannot be explained by the swelling effect of the carbon dioxide dissolved in oil but must be due to some other factors.

5. The input capacity of the four five-spot input wells has been substantially increased and the increase maintained for a period of about 1 year. The magnitude of the increase is approximately 50 per cent. The input capacity of two old wells, which were treated with relatively small quantities of carbon dioxide (recovered from the five-spot producing well) has been practically doubled and the increase has been maintained for several months.

6. As can be noted from the data obtained from the observation well, little if any, carbon dioxide remains behind in the looser zones from which the carbon dioxide had already passed at about the midpoint of the test period.

7. The application of the Orco process produced no corrosion problems.

Phenomena observed.—In addition to the production data several phenomena were observed during this test. Among these are:

1. Frequent qualitative tests showed the presence of organic acids in the produced water during the test. None was found in produced water in nearby areas not treated with carbon dioxide. It has been reported that condensate well fluids show presence of organic acids when carbon dioxide is present and that the organic acids occurring in condensate wells are the lower fatty acids, probably propionic acid, etc.

2. During the first 4 months of the test period there was brought to the surface, with the produced water, upward to about a ton of barium sulfate. The normal amount of barium sulfate produced on this lease consisted of small amounts of what is termed "gyp" and in encrustations on the barrels of well pumps.

3. Orsat analyses of the hydrocarbon fraction of produced gases showed a proportion of sulfuric acid-soluble constituents that increased and diminished as the test proceeded. Even after deducting from this acid-soluble constituent that portion representing certain of the heavier hydrocarbons

(Continued on page 105)

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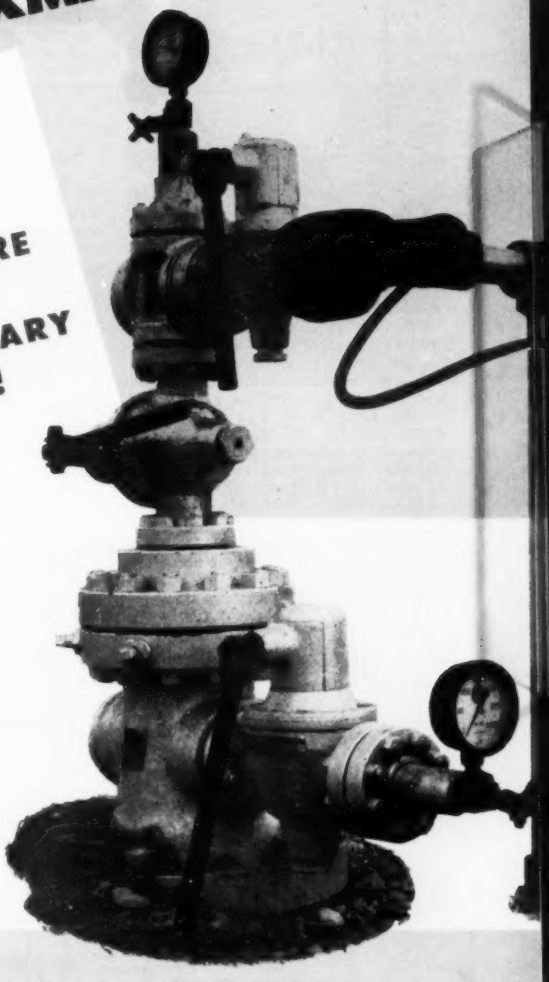

PREMIUM QUALITY
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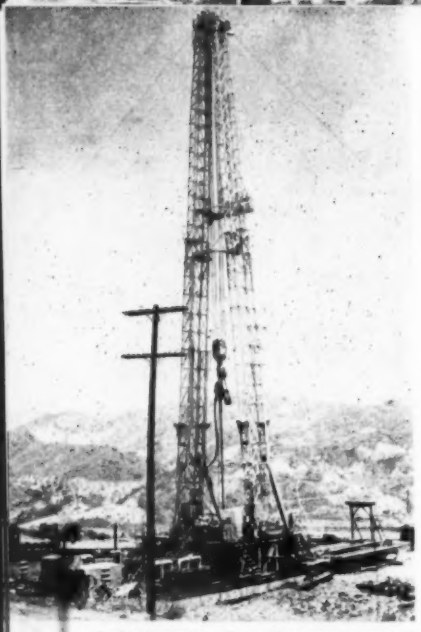
Ventura field scene of tryout of new

Package Drilling Rig

Unit recently completed its first well, and without recording any shutdown time. Hole went to 12,000 ft.



PACKAGE RIG.—Over-all view of new drilling rig, on location near Ventura, Calif.

A MAJOR oil company and the Ideco division of Dresser Equipment Co. have cooperated to produce a heavy-duty drilling rig designed to eliminate many of the hazards due to mechanical failure while drilling a well, and at the same time provide a minimum number of packages to be transported between locations. It has also been designed for ease of setting up and rigging down. Operating in Ventura field, California, this rig recently completed its first well at a 12,000-ft. depth.

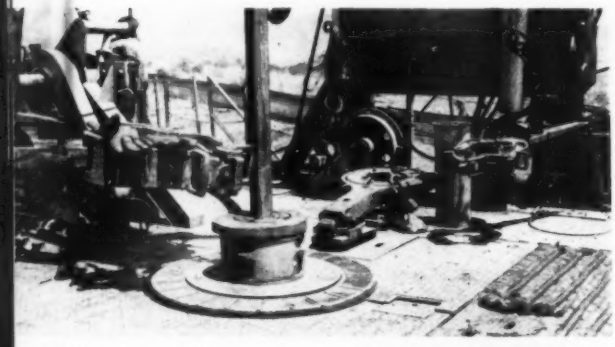
During the entire operation the rig recorded no shutdown time. Its first move showed an appreciably reduced cost over that normally experienced in moving and rigging up a unit of this size. Drilling is now progressing on the second well at below 10,000 ft.

This new rig contains no radical or untried equipment. The draw works is an Ideco 1350-S, 1,700-hp. torque-converter-equipped unit. It is the largest torque-converter rig with 100 per cent friction-clutch operation ever placed in service. The torque converter retains all of the flexibility associated with a steam rig but is not encumbered with the inherent disadvantages associated with steam drilling equipment. A unique clutch and throttle control insures engagement of the clutch before the throttle can be advanced; thus reducing shock and wear on chains, bearings, shafts, and clutches throughout the entire hoist, transmission, and compound.

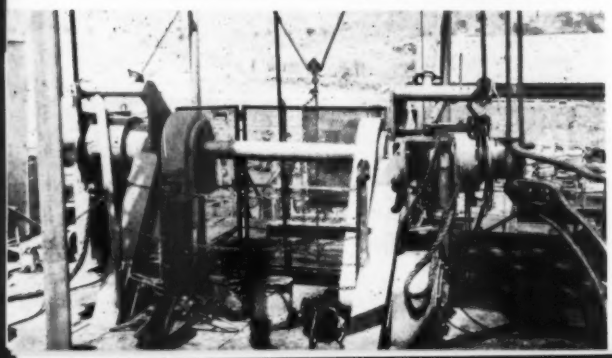
Power for the rig is supplied by two identical units, each equipped with two Hall-Scott V-12 gas engines which develop 425 hp. at 1,800 r.p.m. Engines are equipped with special two-speed governors for pump service and 1,800-r.p.m. engine speed for hoisting service. This selection is automatic as it is linked to the pump clutch. When this clutch is engaged the two engines automatically select the 1,6000-r.p.m. setting. When the clutch is released the governors return to an 1,800-r.p.m. setting.

Each of the four engines is mounted independently on skids of 10-in. wide-flange beams arranged to be bolted directly to the skids of the engine compound. Engine alignment is maintained by tapered dowels. The engines may be left in operating position when the rig is moved or removed to break down the load to conform to 8-ft. road-width requirements.

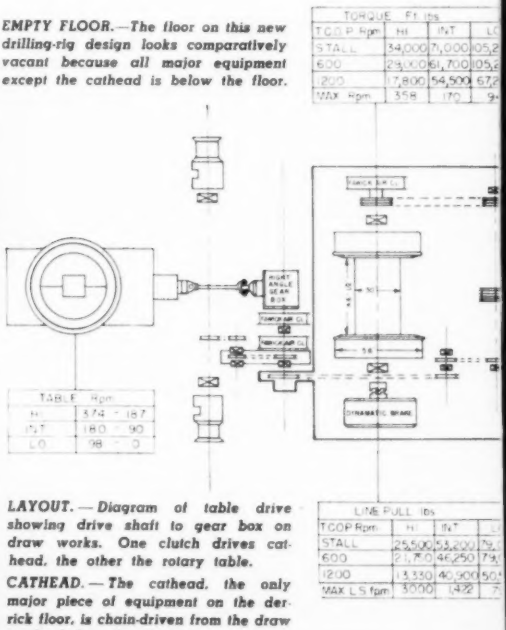
Each engine is equipped with a



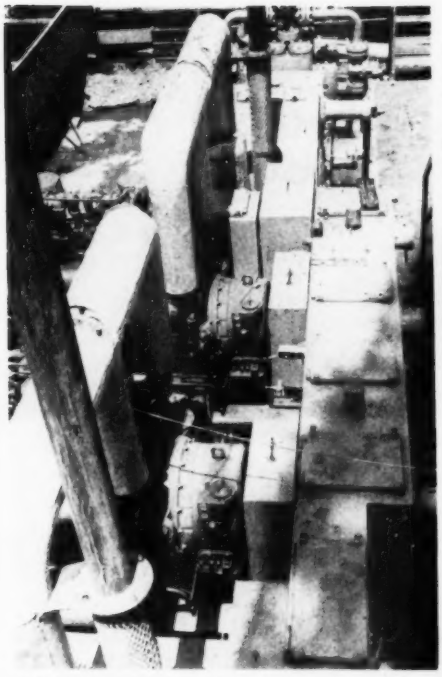
EMPTY FLOOR.—The floor on this new drilling-rig design looks comparatively vacant because all major equipment except the cathead is below the floor.



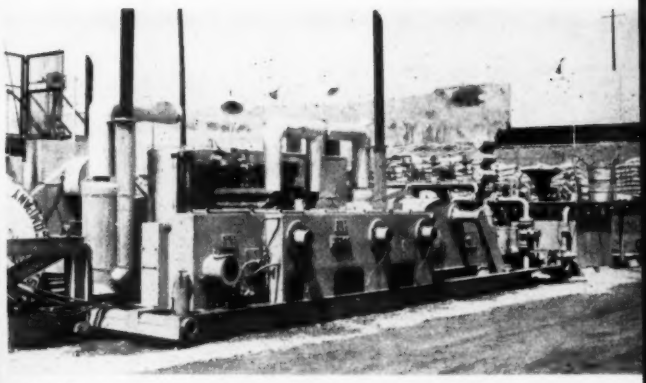
CATHEAD.—The cathead, the only major piece of equipment on the derrick floor, is chain-driven from the draw works below the floor.



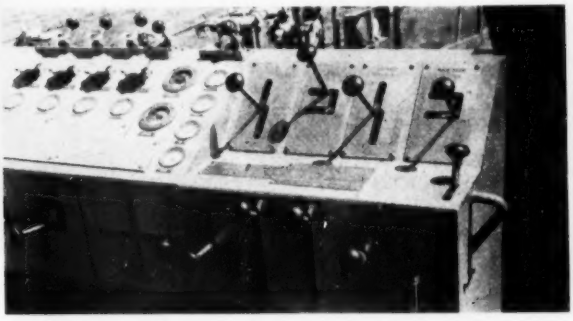
LAYOUT.—Diagram of table drive showing drive shaft to gear box on draw works. One clutch drives cathead, the other the rotary table.



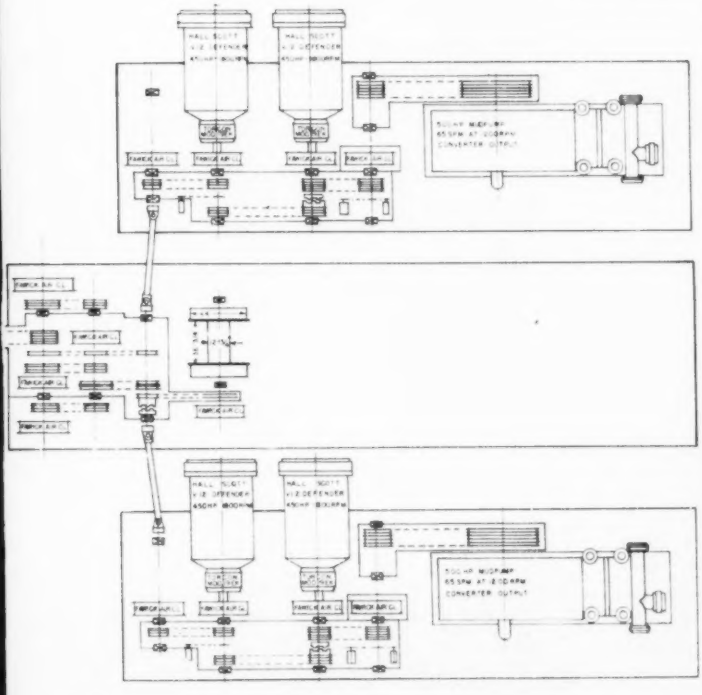
TORCON CONVERTERS.—This view taken over the top of one of the package power units, shows the Torcon fluid converters.



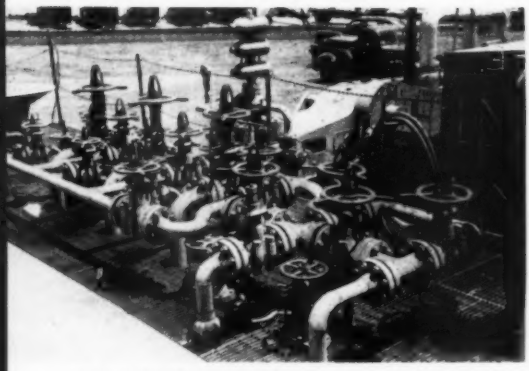
PACKAGED POWER.—One of the package power units on rig; there is one on each side of the dog house.



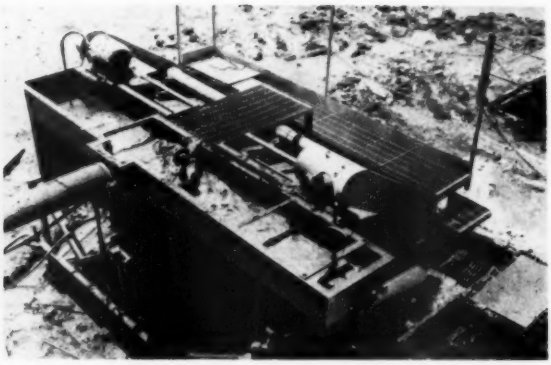
DRILLER'S "ORGAN."—This modern console enables the driller to have finger-tip control on virtually all equipment on the rig.



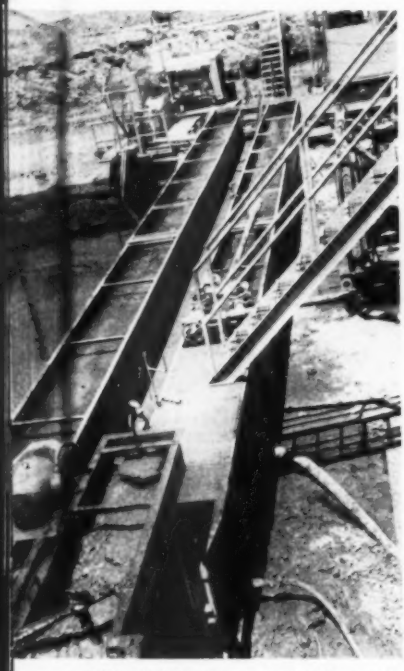
EASY CONTROL.—The driller at the control has completely clear over-all vision of floor and derrick.



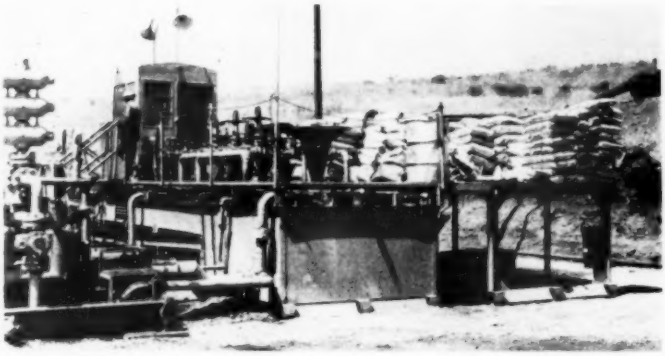
MUD MANIFOLD.—Manifold setup on top of mud tank.



SHALE SHAKER.—The shaker on rig has two motors, one at each end.



MUD FLUMES.—These mud-line flumes from shaker to mud tank can be switched alternately, so one can be cleaned while the other continues operation.



MUD TANK.—General view of the mud tank, showing manifold installations at top.

Torcon Model 19-ED torque converter and is coupled to the compound through Fawick air clutches. Engines are equipped with air starters and Kittell silencers. The torque converters are cooled by Ross heavy-duty heat exchangers.

Output shafts of the compound are designed to accept the propeller shaft drive on either end. Thus the two power packages each consisting of two engines, compound, and pump are absolutely interchangeable.

Each two-engine and compound unit is equipped with a D-500 Emsco slush pump driven through an oil-bath-enclosed chain drive, all components being mounted on a heavy-duty common skid. One set of engines can be used for both pumps independent of the other set of engines, or both units can be compounded to the transmission, draw works, and rotary table. The two power packages are placed on opposite sides of a 40-ft. long, transmission skid base, and are connected to the transmission through universal-joint propeller-shaft drives.

The transmission contains three forward speeds and one reverse. All speeds are obtained through direct air-friction clutches. The high and low clutches are mounted outboard for easy accessibility. The intermediate speed clutch is mounted between bearings but the clutch element is replaceable in position.

All controls are grouped in a console cabinet at one corner of the derrick floor (a doghouse is supplied for the comfort of the driller). The controls most frequently used are positioned within reach of the driller as he stands at the console.

The catworks is a movable unit connected to the rotary drive and supported by the substructure spreader assemblies. Catworks and rotary table are recessed in the derrick floor to provide a flush derrick-floor area.

The catworks consisting of the catshaft and right-angled gear box with propeller shaft drive to the rotary table and attendant countershafting and enclosed chain drives is mounted on a skid assembly. A double reduction is used on the catshaft drive to permit the combination of low catshaft speeds and high drilling speeds. An inertia brake mounted on the catshaft in conjunction with the catshaft drive clutch gives single-lever control of both operations; thus in an emergency only the inertia of the catshaft itself must be arrested.

During moves the rig is separated into 11 loads, each being of a size that can be moved on a heavy-duty truck or trailer. These 11 loads break down in the following components: Load No. 1, mast; 2 and 3, the two-piece box substructure; 4, catworks; 5, draw works; 6, transmission; 7 and 8, compound units and pumps; 9, mud-mixing unit; 10 and 11, mud tanks.

Over-all design of rig places all of the heavy components at ground level with the exception of the draw works which is at 4-ft. elevation.

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. . . says Ellis Bruce, tool pusher for Wheless Drilling Company, Shreveport, La.

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For good, long runs use the **REED** "LB"

REED "2C" Rock Bit

Mr. Bruce is shown here with a **REED** "2C" Rock Bit. **REED** "2C", "2CW" and "2CWW" Bits do a good job in Travis Peak drilling.

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2663

Well Logging in the Spraberry

by W. J. Lytle* and R. R. Rieke†

The authors say: "The preferred method for the Spraberry is the combination gamma ray-induction log." And here they tell why, with actual field data.

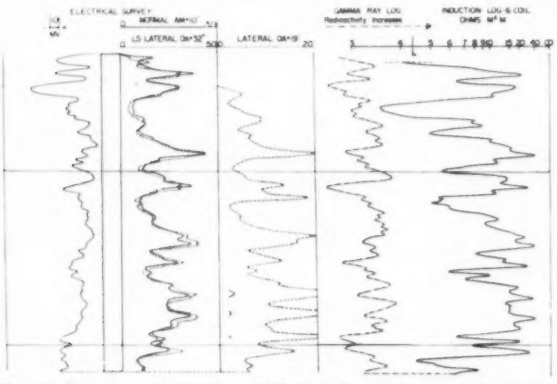

Fig. 2—Comparison of gamma ray-induction log (right) with conventional electric log (left). Germania field, Midland County, Texas.

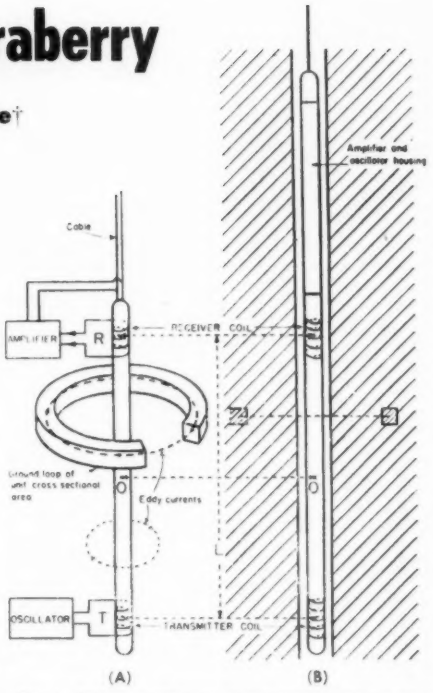

Fig. 1—Schematic diagram of induction logging system.

THE current development of the Spraberry trend has created more interest in oil circles than any development since that of East Texas field. To date, over 670 wells have been drilled on the trend and have proven a productive area of approximately 500,000 acres. Since new producing segments (or fields) are being discovered weekly, it is expected by many that the ultimate proven area will exceed 1,000,000 acres and may even reach 2,000,000. Even with conservative estimates of 3,000 or 4,000 bbl. of oil per acre, the probable oil reserves are of the same order of magnitude as those of East Texas field.

Other important factors, in addition to the vastness of both area and oil reserves, have tended to focus attention on the Spraberry. By and large, these factors concern the economics of the development. Drilling costs are high, yet at the same time it is recognized that well productivities will be low. Some of the reservoir problems are unusual, and certain techniques are being changed to afford a better solution. Electrical and other well-logging methods are among the techniques being carefully reviewed.

*Schlumberger Well Surveying Corp., Midland, Tex. †Schlumberger, Houston. This paper comprises Part 4 of the Journal's T.P.R.C. "Spraberry Symposium," previous sections of which have appeared in the Journal's issues of November 22, page 74; November 29, page 96; December 6, page 94.

Geology and Reservoir Characteristics

The Spraberry (a part of the lower Leonard section of the Permian series) averages 1,000 ft. in thickness and is composed of relatively thin alternating beds of limestone, shale, and sandstone. It is divided into three sections known as the upper, middle, and lower Spraberry. The upper and lower sections have the better sand developments and hence are the better oil reservoirs. They are estimated to have a net pay thickness of 90 and 170 ft. respectively. The middle section is predominantly shale with a total sand development of 50 ft. or less.

All of the reservoir rocks in the Spraberry are characterized by both low porosity and low permeability. The better-developed sandstones exhibit porosities from 8 to 18 per cent, with the limestones and shaly sands grading down to exceedingly low values, often less than 5 per cent. Permeabilities are also exceedingly low and will probably average less than 1 md. In fact, the average values are so low that good production cannot be anticipated without artificial stimulation. Drill-stem tests may indicate production, but a well cannot be condemned because of a poor test.

Fractures.—The unique characteristic of the Spraberry section is the broad vertical fracture system developed in it. Cores from all wells drilled exhibit these vertical fractures and it is now recognized that the productive ability of a well is dependent on the size of the fractures crossing the drill hole. It is difficult to estimate the fracture size from the cores and there is much conjecture over their actual in situ dimensions.

It is believed that these fractures vary in size from less than one-thousandth of an inch to as much as one-fourth of an inch. Indications are that the fractures cross all members, limestones, shales, and sandstones alike, in the section but die out before reaching adjacent geological sections.

Another important Spraberry characteristic is its low formation pressure. Bottom-hole pressures are about 700 psi. below normal pressures for equivalent depths. This condition creates additional problems in both drilling and completion techniques. It is partially responsible for the wide usage of oil or oil-base muds in the drilling of the sections.

Because of the apparent "closed" condition of the total reservoir and the low bottom-hole pressures, it is assumed that the only drive mechanism available for flow conditions is one of solution gas. Production data to date appear to support this supposition.

Well-Logging Techniques

It has already been mentioned that the Spraberry section is usually

drilled with oil or oil-base mud. Since oil is a nonconductor of electricity, the conventional electrical log cannot be run under such conditions. Certain other Spraberry wells are drilled with cable tools, and hence with holes void of fluid. Such empty holes also preclude the use of the regular electrical log.

As a result, the logging method being used in the Spraberry today is a combination gamma ray-induction log. This combination works equally well in holes full of oil or empty. It has the added advantage of operating satisfactorily in water-base fluids also, so that there is no problem of the log character being dependent on drilling fluid, regardless of the drilling technique.

Since the principle of the induction log is unknown to many, a brief description of the technique is in order. In this method of logging, the formations surrounding the logging apparatus are energized by electromagnetic induction. To that end, an alternating current of an appropriate frequency is made to flow through a "transmitter" coil. The alternating magnetic field due to this current induces eddy currents in the earth surrounding the coil. These eddy currents in turn have their own magnetic field, which induces an electromotive force in a "receiver" coil.

If the transmitter current is maintained at a constant value, the magnitude of the eddy currents is proportional to the conductivity of the earth. It follows that the electromotive force thus induced in the receiver coil is also proportional to the conductivity of the earth, and, consequently, inversely proportional to the earth resistivity.

Fig. 1A shows schematically a simple induction logging system in which a transmitter coil and a receiver coil are wound coaxially on a supporting insulating mandrel. The distance between the coils, designated in the figure as L, is called the "spacing."

An alternating current of constant magnitude and frequency is fed to the transmitter coil from an oscillator, which, with the amplifier, is actually housed in an electronic cartridge above the coil system. (See Fig. 1B.)

The voltage induced in the receiver coil by linkage with the magnetic field of the eddy currents is fed into an electronic system in which, after being amplified, it is rectified into direct current for transmission in the cable to the surface where it is recorded. As with conventional electrical logging, the readings are recorded continuously on film as the instrument is moved in the hole. The point of measurement is taken to be at point O, midway between the coils.

The induction log is calibrated in the same resistivity units (ohm m²/m) as the conventional resistivity log, but the scale is hyperbolic (approximately logarithmic). Because of this, high ohm values are compressed on the log, while the low ohm values are amplified. The amplification of these low ohm values is very helpful in locating water-bearing sand zones. It also shows up shaly sands of high water saturation to good effect. Because a resistivity scale is applied to the induction log, regular quantitative interpretation techniques applicable to resistivity logs can be used. It must be emphasized, however, that actual ohm values must be carefully checked, because of the nonlinearity of the scale.

In view of the relatively wide usage of the gamma ray log in the industry today, it is not considered necessary to discuss it separately here. It should be sufficient to make proper reference to it as a part of the combination gamma ray-induction log as we proceed with the text.

Interpretation of Gamma Ray-Induction Logs

Perhaps the best way to familiarize the reader with the characteristics of the gamma ray-induction log is to compare such a recording with a conventional electrical log. Such a comparison is found in Fig. 2, which displays a complete electrical survey (all curves) together with the gamma ray-induction log of a short Spraberry section in Germania field, Midland County. Water-base mud was used to drill the Spraberry in this well with the result that the regular electrical log is of good quality. There is good general agreement between the self-potential and the gamma-ray curves. However, limy sands, relatively free of shale, will show minimum radioactivity values (maximum deflection to the left), whereas the self-potential deflections will be lessened. Sand anomalies on the lower half of the figure are thus considered to be limy, whereas the sand at the top is relatively clean. The resistivities on the two logs compare excellently when one considers that the resistivity scale of the electrical log is linear while that of the induction log is hyperbolic.

As an additional aid for the interpretation of gamma ray-induction logs in the Spraberry, an idealized log is presented in Fig. 3. Idealized, or type logs, obviously must be based on the empirical study of many logs and attending core descriptions. Such a study in the Spraberry has made it possible to determine the lithology of the section with good accuracy from the electrical log alone. It has also permitted a qualitative approach to porosity determinations.

Estimates of porosity are entirely dependent on curve character (both gamma-ray and induction log) and are

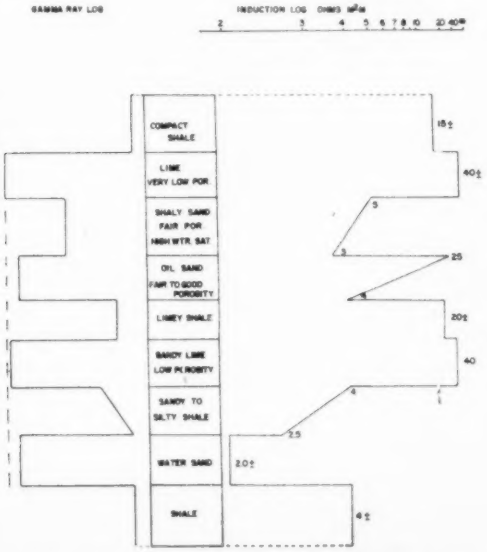

Fig. 3—Idealized gamma ray-induction log for Spraberry formations.

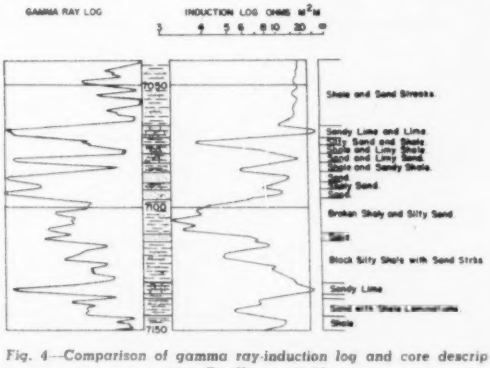

Fig. 4—Comparison of gamma ray-induction log and core description, Tex-Harvey field.

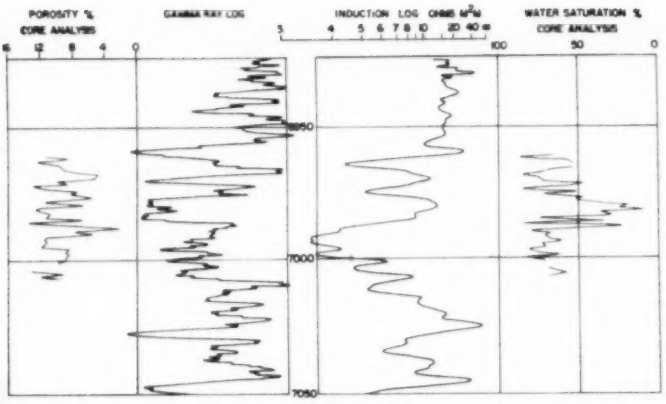

Fig. 5—Comparison between gamma ray-induction log and core analysis, upper Spraberry, Tex-Harvey field.

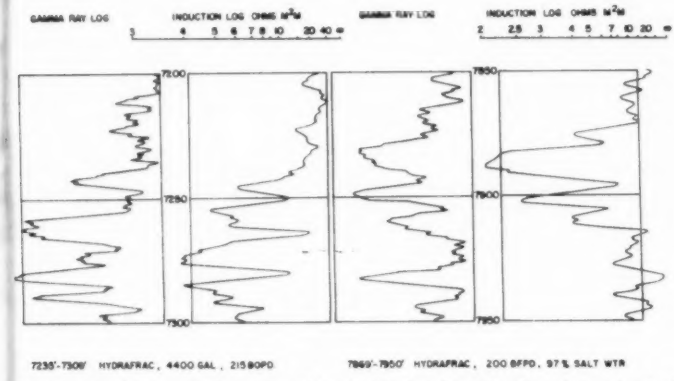

Fig. 6—Log at left is upper Spraberry (oil bearing), right is lower Spraberry (water bearing).

represented as good, fair, or low. The many empirical comparisons which have been made indicate a porosity range from 14 to 18 per cent as good, a range from 10 to 14 per cent as fair, and from 6 to 9 per cent as poor. A brief description of the curve characteristics for the various lithological types as exhibited on Fig. 3 is as follows:

Compact shale.—High radioactivity and intermediate resistivity values of the order of 15 ohm m^2/m.

Lime; very low porosity.—Low radioactivity and high resistivity values of the order of 40 ohm m^2/m.

Shaly sands; fair porosity; high water saturation.—Intermediate radioactivity and resistivities usually from 3 to 5 ohms. The low resistivities are due to the high water saturation and the presence of conductive shales.

Oil sand; fair to good porosity.—Low radioactivity and resistivities usually ranging from 4 to 25 ohms. In general the resistivities will vary inversely with the porosity. Therefore, higher resistivities correspond to lower porosities and lower resistivities to the higher porosities.

Limy shale.—Fairly high radioactivity, and resistivity values of the order of 20 ohms, and often higher.

Sandy lime; low porosity.—Low radioactivity and high resistivities of around 40 ohms.

Sandy to silty shale; low porosity.—Rather high radioactivity and low resistivity values of around 2.5 to 4.0 ohms. Such shales have relatively high water saturations.

Water sand; good porosity.—About the same radioactivity as oil sands, and low resistivity values.

Shale.—If not too compact, has very high radioactivity and resistivities of around 4 ohms.

Fig. 4 is a typical gamma ray-induction log with core description in the Spraberry, Tex-Harvey field. Comparison of this figure with the idealized log of Fig. 3 substantiates the fact that the combination log can be used to determine lithology of the section. The actual core descriptions of the various strata, together with the associated log as recorded, correspond very well to the values set by the idealized log. Although porosity values are not given by the core descriptions of Fig. 4, the correspondence also justifies the assumption of porosity ranges as given in the idealized log data. Considering the core descriptions of Fig. 4, the following specific comparisons illustrate the above points:

Shale and sand streaks (compact shale of Fig. 3).—Little effective porosity. The lithology is easily determined by high radioactivity and intermediate resistivity values, 15 to 17 ohms.

Sandy lime and lime (sandy lime of Fig. 3).—Low porosity. These strata have low radioactivity and high resistance values equal to or greater than the 40 + ohms shown by the idealized log.

Silty sand and shale (sandy to silty shale of Fig. 3).—Low porosity. This section shows fairly high radioactivity and low resistivity within the range of 2.5 to 4 ohms established by the idealized log.

Sand (oil sand of Fig. 3).—Fair to good porosity. The main sand body from 7,085-97 ft. in Fig. 4 shows low radioactivity and a resistivity maximum of 13 ohms, which marks it as oil bearing according to the idealized log. This sand is the main producing member in this example. After a Hydrafrac treatment, this well produced 240 bbl. of oil per day with about 5 per cent salt water. The operator believes that the small amount of water is coming from the shaly sand just below 7,100 ft. The intermediate radioactivity and low resistivity of this section corresponds to high water saturation.

Fig. 5 shows another typical Tex-Harvey example in the upper Spraberry. In this case porosity and water saturation as determined by core analysis are included with the combination gamma ray-induction log. As was the case in the previous example, it is possible to interpret the lithological character of the component beds by use of the idealized log. The example also indicates a correlation between the induction log and the plot of the water saturation.

The main producing sand member from 6,975-85 ft. shows an intermediate resistivity of about 15 ohm m^2/m. The core analysis on this sand shows a porosity of approximately 12 per cent and an average water saturation of about 25 per cent. The more shaly sand member from 6,900 to 7,000 ft. shows a low resistivity. Here the core analysis gives porosity values only slightly less than in the better developed sand above. Therefore, the low resistivity (of the order of 3.5 ohm m^2/m) can only indicate a high water saturation. This is confirmed by the core analysis, which gives a water saturation of approximately 70 per cent.

Semiquantitative Analysis of Gamma Ray-Induction Logs

From the above it would appear that quantitative log interpretation can be applied to the Spraberry—

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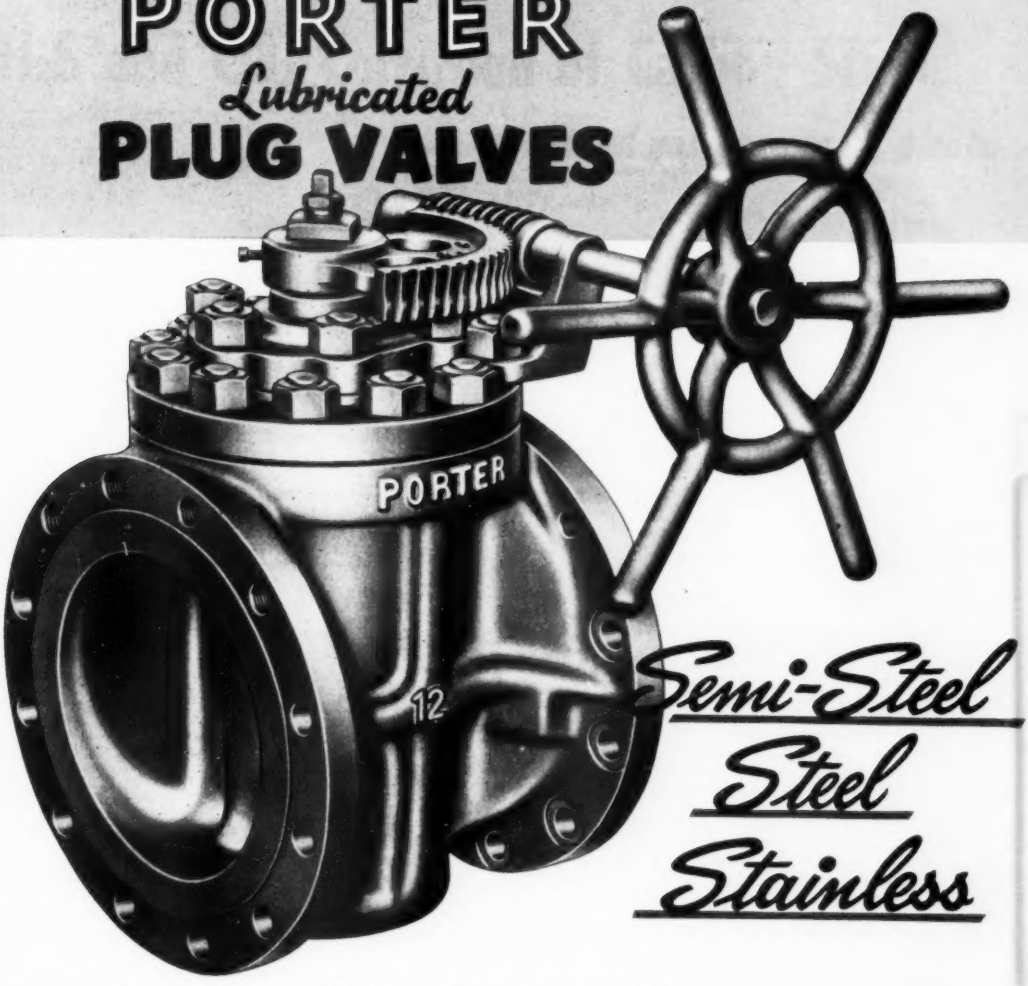

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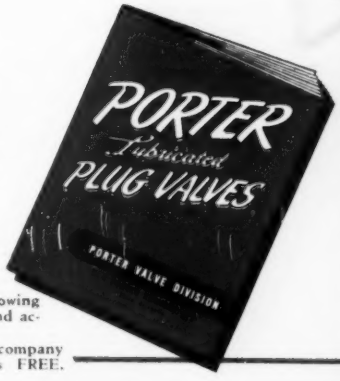

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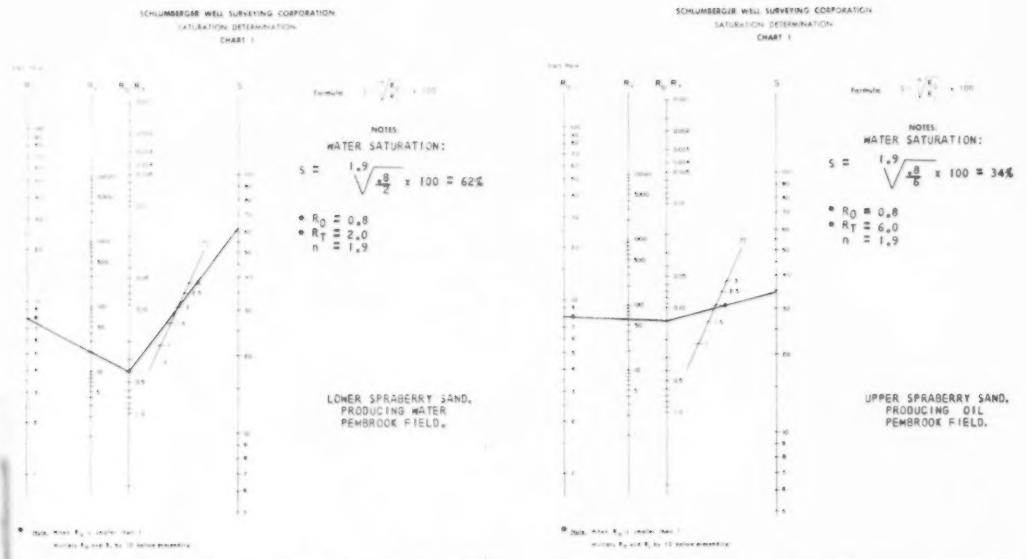


Fig. 7—Some ranges of values and averages for use in quantitative analysis of Spraberry sand. (Copyright U.S.A. 1951, Schlumberger Well Surveying Corp.)

RESISTIVITY OF FORMATION WATER
R_w: .03 to .04 at 130° F. equivalent NaCl 125,000 to 175,000 p.p.m. Average R_w .035.

RESISTIVITY OF FORMATION WHEN 100 PER CENT WATER
R_o: 0.7 to 3.0 for porosities ranging from 8 to 20 per cent. Average R_o 1.3 porosity 12 per cent.

TRUE RESISTIVITY OF FORMATION
R_t: From induction log, recorded in oil.

CEMENTATION FACTOR
m: Usually about 1.8, possibly lower for clean sands.

FORMATION FACTOR
F: From about 20 to 100.

POROSITY
P: From about 8 to 20 per cent for sands.

SATURATION ROOT
n: Used in calculating water saturation. Usually less than 2.0 for shaly sands.

even in the absence of conventional electrical logs and normal muds. This is true, at least insofar as water saturation values on the clean sand sections are concerned. However, it should be considered that the values obtained are less accurate than those obtained under more normal conditions. The difficulties encountered can be best explained by a discussion of the factors involved in the quantitative study.

R_o The resistivity of the sand when 100 per cent water bearing.—Unfortunately, this value is seldom, if ever, found in practice, because some oil is thought to be present in all sections of the Spraberry whether oil or water productive. It has, therefore, been necessary to establish a value R_o by means of the relation $R_o = R_w p^m$.

The formation water resistivity, R_w, has been measured a number of times and found to vary from 0.03 to 0.04 ohm m^2/m at 130° F. An average value of 0.035 ohm m^2/m can therefore be taken. A value of 1.8 is assumed for the cementation factor m. This is the value usually ascribed to cemented sandstones.

From the above relation, it is seen that R_o varies inversely with porosity. Using R_w = 0.035 ohm m^2/m, m = 1.8, and an average value of porosity = 12 per cent, an average value for R_o of 1.3 ohm m^2/m is obtained. If the porosity is known to be good instead of fair, the value of R_o will be reduced. For a porosity of 18 per cent, R_o becomes 0.8 ohm m^2/m.

R_t The true resistivity of the formation.—A close approximation of this value is obtained directly from the induction log provided the bed is 3 or more feet thick. If the well is drilled with oil or the hole empty, all

(Continued on page 105)

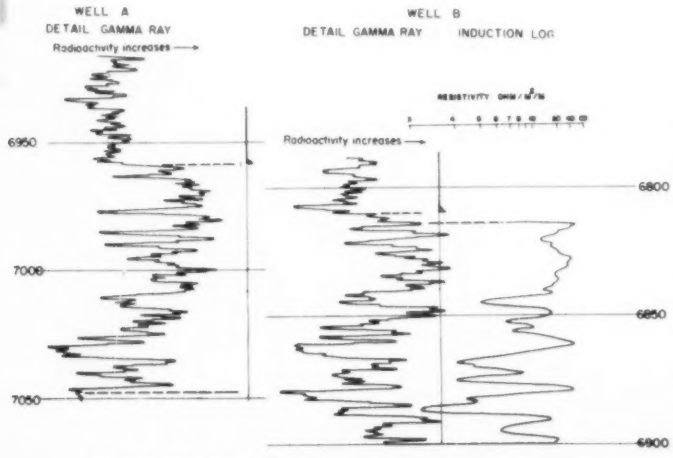


Fig. 8—New type detailed gamma ray log run in Spraberry sections.

H_2S and CO_2 Corrosion of Carbon Steel

. . . in natural-gas processing plants

by D. E. McFaddin*

Here are some conclusions based on a study undertaken by Union Oil Co. at its Santa Maria Valley operation

THE problem of H_2S and CO_2 corrosion in processing petroleum hydrocarbons is far from being completely understood or solved, even though many excellent technical papers on the subject have been published. However, experience during recent years has taught many things and it is believed that further progress can result from studies of individual case histories. Therefore, instead of attempting to give a technical discussion here, a few simplified observations will be related.

It should be remembered that the majority of all petroleum gases and vapors contain at least traces of H_2S and CO_2, which are by nature considered to be corrosive to those metals in common use. A natural tendency, whenever corrosion is found in a gas or vapor stream, is to inquire about CO_2 and H_2S in the gas and then blame the corrosion on their presence with an air of finality, overlooking the fact that no corrosion problem is found in many other cases where the CO_2 and H_2S content is much greater. In this manner, several years ago severe corrosion in compressor aftercooler coils was attributed to H_2S concentrations of less than 1 grain per 100 cu. ft., and likewise, the necessity of replacing still trays was attributed to corrosion from a few per cent of CO_2 together with less than a grain of H_2S.

Consequently, it was with great trepidation that the task of processing gas at the Santa Maria Valley, California, field, containing 7 per cent CO_2 and 15 grains of H_2S, was undertaken by Union Oil Co. in 1943. Subsequently these concentrations have increased to 18 per cent CO_2 and 40 grains H_2S in the composite plant intake, making necessary installation of a Girbotol monoethanolamine unit to reduce the CO_2 concentration to marketable limits.

Corrosion at the Santa Maria plant, as would be expected, has been very severe and costly, especially in the CO_2 and H_2S removal units. The following conclusions are based largely on observations at this plant, which in addition to the conventional compression, absorption, fractionation, and dehydration operations also includes a Ferrox H_2S unit, which removes approximately 85 per cent of the H_2S from the first-stage compressor discharge gas (75 psig.). The gas then flows to the Girbotol MEA unit, which in turn removes the required amount of CO_2, together with a small additional portion of the H_2S. Complete and final removal of the H_2S is effected in iron oxide beds at the discharge of the second stage of compression (200 psig.). The gas is next processed in the conventional absorption-plant units. Intake gas for the plant is gathered from the field under a slight pressure so that oxygen is not present at the Ferrox or Girbotol units; however, it is necessary to inject 1 per cent of air to the iron oxide beds in order for these units to operate properly. A portion of the extracted CO_2 from the MEA unit is purified and converted by compression and expansion into dry ice.

*Process engineer, Natural Gas and Gasoline Department, Union Oil Co. of California. Presented at twenty-sixth annual fall meeting, C.N.G.A., Los Angeles, 1951.

TABLE 1—BASIC CHANGES WHICH TAKE PLACE DURING CO_2 AND H_2S CORROSION

Direct attack on steel:

(1) Metal $Fe + H_2S \rightarrow$ Insoluble black PPT $FeS + H_2$ (embrittlement)

(2) Metal $Fe + CO_2 \rightarrow$ Apparently no reaction unless H_2O, O_2 or H_2S or some other active substance is present.

(3) Metal $Fe + 2CO_2 + 2H_2O \rightarrow$ Soluble $Fe(HCO_3)_2 + H_2$ (active)

Secondary reactions:

(4) $Fe(HCO_3)_2 + H_2S \rightarrow$ Insoluble black PPT $FeS + 2H_2O + 2CO_2$

(5) $Fe(HCO_3)_2$ + Heat or Dehydration $\rightarrow$ Siderite, insoluble-gray $FeCO_3 + H_2O + CO_2$

(6) Protective $FeCO_3 + H_2S \rightarrow$ Insoluble black PPT $FeS + H_2O + CO_2$

(7) $4FeCO_3 + O_2 + 10\ H_2O \rightarrow$ Reddish brown jelly PPT $4\ Fe(OH)_3 + 4H_2CO_3$

(8) $4Fe(OH)_3 + 6H_2S \rightarrow$ Very active soft green PPT $2Fe_2S_3 + 12\ H_2O$

(9) $4FeS + 3\ O_2 \rightarrow$ Very active brown PPT $Fe_2O_3 + 4S$ See equation 12 below.

Oxide bed purifier basic reactions—continuously regenerative:

(10) $2Fe_2S_3 + 3\ O_2 \rightarrow$ in alkaline solution $2\ Fe_2O_3 + 6S$ yellow sulfur

(11) $2Fe_2O_3 + H_2O + 6H_2S \rightarrow 2Fe_2S_3 + (6 + 2X)\ H_2O$

(12) $FeS + S \rightarrow$ Pyrites will not regenerate FeS_2

General Conclusions

General conclusions derived from operation of this equipment are:

1. Corrosion due to CO_2 is no problem even with 100 per cent CO_2 and high pressures, provided no water is present. A gray protective carbonate is formed on the internal surface of the steel and corrosion does not progress into the metal. Copper, brass, and nickel also give satisfactory service.

2. Free water in the presence of CO_2 becomes acid, which is highly corrosive.

3. Hydrogen sulfide, similar to CO_2, will directly attack steel and most other metals in general use. The metallic sulfides in general are softer and more bulky than the carbonates and trouble from them is sometimes found in the plugging of burner tips and control equipment made of copper or zinc alloys. However, the ac-

tual loss of metal in these instances is usually not great.

4. Hydrogen sulfide reacts readily with certain hydrate oxides of iron and, consequently, severe corrosion from H_2S is usually limited to locations where moisture and oxygen are present.

5. The combination of H_2S plus CO_2, plus water, is much more corrosive than combinations in which either the H_2S or the CO_2 is absent, or is present in relatively small amounts. For example, the corrosion in an amine plant operating on either H_2S or CO_2 can be expected to be much less than when processing gas containing both, and confirming this, marked increases in corrosion were found at the Santa Maria plant whenever the H_2S content in the gas from the Ferrox unit to the Girbotol unit increased to above a few grains.

In the corrosion process iron is first dissolved as ferrous bicarbonate and then precipitated from the solution by H_2S as ferrous sulfide. This presents a fouling problem in addition to a corrosion problem. Since the ferrous bicarbonate is more soluble than the ferrous sulfide, and assuming a continuous supply of CO_2 and H_2S, it is apparent that corrosion can proceed as long as iron is exposed to the attack. However, the rate and extent to which the iron is dissolved by the MEA solutions is dependent upon the CO_2 saturation and temperature as well as by impurities and other substances present. In general, it has been found that the attack proceeds rapidly at temperatures above 265 F., and the equipment and process should be designed to permit operating at temperatures below this temperature and also to employ low velocities and small temperature differences.

6. The use or presence of caustic or alkaline materials has been suggested for neutralizing the acid gases, H_2S and CO_2, and the injection of small amounts of ammonia has been advisable in mitigating corrosion in absorption-plant stills. However, corrosion in the soda ash and MEA streams of the Ferrox and Girbotol units at the Santa Maria plant has been exceedingly severe, probably because the oil and other protective films are kept cleaned away by these alkaline materials. Therefore, it is suggested that caution be applied to the use of neutralizing agents.

7. Protective films composed of lubricating oil, crude oil, or some other material, such as glucosides, often prevent the corrosion from becoming a problem. However, lighter fractions apparently do not give protection and severe corrosion is found in gasoline condensers and gas coolers where all traces of crude or lube oil have been removed. Similarly, extensive corrosion is found in condensate wells whereas corrosion in heavy crude oils is limited to areas of the casing and tubing from which the oil has been washed away by the condensation of water and light hydrocarbon vapors.

8. Galvanization for lease storage tanks has been found effective in combating corrosion in the vapor zone.

9. The gas-gathering system is generally fairly well protected by entrained crude oil.

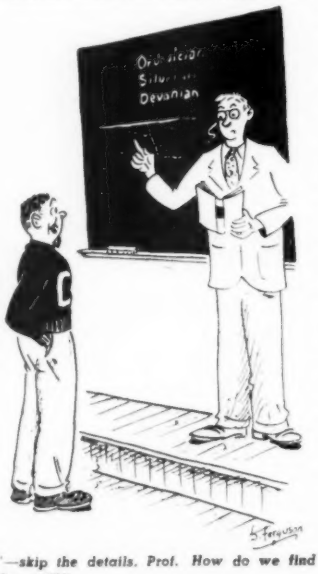
10. Compressors should be satisfactorily protected by lube oil which may be injected directly into the compressor cylinder intake to protect the intake valves and valve springs.

11. CO_2 corrosion resulting from steam condensation in heater and reboiler units and in steam and steam condensate lines is best controlled by proper processing of the boiler feed water to remove all potential CO_2 including the conversion of bicarbonates to CO_2 plus carbonates. Protective films have also been found effective in this case.

12. CO_2 and H_2S attack steel in several manners:

(a) Stress corrosion is a major problem in MEA plants and is found in the piping or vessels carrying the liquid amines. It is characterized by a small "pin hole" or short crack near a weld, and since the full thickness of the metal remains adjacent to the crack, the leak may be patched. Annealing has been found effective in mitigating this type of corrosion. It has also been suggested that lignins or nitrates would be helpful in combating this problem. This type of corrosion is found in other chemical processes and usually reflects a case in which the rate of attack depends on differences in temperatures and concentrations. The chemical reactions involved are the same as given in 5 above.

Stress corrosion has also been found in compressor second-stage intake valve springs and plates where CO_2, H_2S, and water mist were present and where lube oil was not used to protect these parts. The springs would sometimes break after a few days' use and long and rather wide cracks would penetrate the plates after about a week. The valves in first-stage service received protection from entrained crude oil from the field.



"—skip the details, Prof. How do we find the stuff?"

It has also been observed that embrittlement may occur when steel under strain is exposed to H_2S. In one such case a "rolled-up" type angle flange cracked and it was found that the sulfide had penetrated the metal so that it could not be satisfactorily welded.

(b) The corrosion observed in the vapor zone of CO_2 and H_2S where water is present is of the "general" type and is most severe where the water accumulates, such as on the bottom of horizontal pipes, the outside of elbows, etc. H_2S is not essential to this type of corrosion and we have observed very severe corrosion in cases where the H_2S had been removed. It is usually advisable to keep the lines and equipment well drained of water to minimize this type of corrosion.

(c) "Erosion" type corrosion is often formed by CO_2 and H_2S due to the softness of the corrosion products. It is therefore advisable to keep velocities to a minimum. Some streams, such as MEA, carry suspended solids such as FeS and $FeCO_3$ which erode away any protective films that may form on the metal. Means should be provided for the removal of these solids by distillation, filtering, or settling.

Of course, there are many other types of corrosion, such as galvanic, electro potential, oxidation, soil corrosion, etc., which may be related to or dependent upon direct attack by CO_2 and H_2S. These phases have not been dealt with here in order to simplify the problem. However, 12 chemical reactions are tabulated in Table 1, which it is believed represent the basic changes which take place during CO_2 and H_2S corrosion. Basic reactions for ferric oxide bed purification are included to emphasize the rapid rate and degree of completion of these reactions.

A description of the precipitate and the name of a corresponding mineral have been noted above some of the chemicals listed in the table in an attempt to give a better understanding of the materials involved. However, it should be remembered that impurities and reaction conditions may alter these characteristics appreciably. The terms "soluble" and "insoluble" are used in the table in a relative manner to explain the reaction mechanisms.

Acknowledgment

Grateful acknowledgment is made to V. N. Jenkins of Union Oil Co. research department, who has contributed explanations of many of the chemical phenomena present here.

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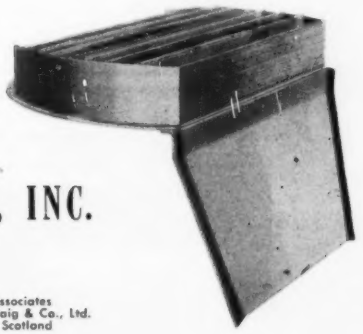

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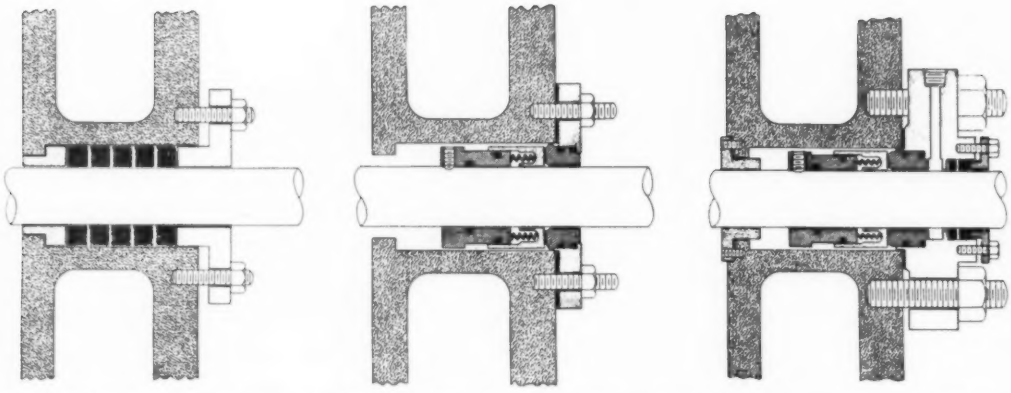

Fig. 1—Stuffing box conversion from soft packing to mechanical seal. Left: Typical soft packing installation. Center: Soft packing replaced with mechanical seal using same size gland and bolting. Right: Mechanical seal retaining assembly after strengthening. (Larger bolting and thicker gland required by design codes.)

Problems associated with

Centrifugal Seal Retaining Assemblies

in centrifugal pumps

by L. T. Ellis, Jr.* and C. L. Fussel*

A SERIOUS and widespread weakness in mechanical-seal installations has been found to exist on centrifugal pumps which were originally designed for soft packing. A bolting failure on such an installation caused a large fire at one of the refineries of Esso Standard Oil Co., and a similar failure which resulted in a serious gas release is known to have occurred at another refinery. The weaknesses found on the installations which failed and on other pumps since that time at these refineries may exist at other plants where soft packing has been replaced with mechanical seals without adequate engineering design. It is hoped that the information which follows concerning one Esso refinery may enable other plants to avoid failures due to weaknesses in mechanical-seal retaining assemblies.

*Esso Standard Oil Co., Baton Rouge, La. Paper presented at A.S.M.E. petroleum mechanical engineering conference, Tulsa, September 1951.

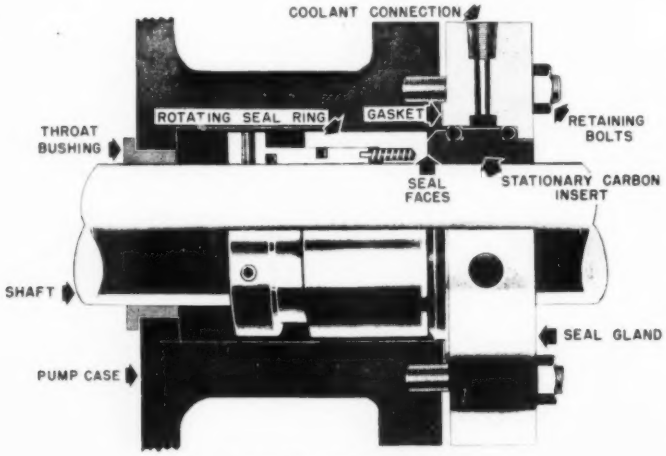

Fig. 2—Typical mechanical seal installation.

Although mechanical seals were used on a limited basis at Esso's Baton Rouge refinery as early as 1938, their broad use did not begin until 1947. Since that time approximately 350 seals of various types have been installed on centrifugal pumps in services ranging from propane to crude oil. Most of these seals were installed at the refinery as replacement for soft packing without due consideration being given to design of holding members.

Seal-gland plates were generally patterned after the packing glands for particular pumps insofar as thickness and diameter were concerned, and the original bolting provided for soft packing was often reused for retaining the mechanical seal. (See Fig. 1.) Typical mechanical seals require the seal-gland plate to be attached to the pump case in a leakproof gasketed joint. (See Fig. 2.)

Bolting sufficient to retain soft packing in a stuffing box is usually

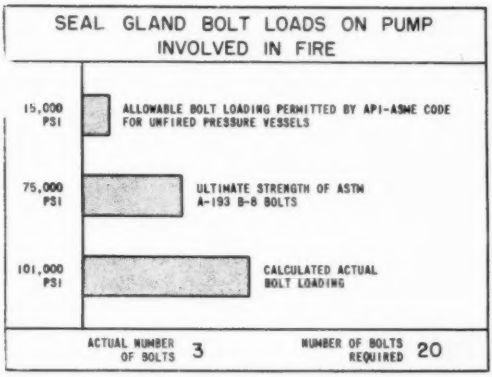
SEAL GLAND BOLT LOADS ON PUMP INVOLVED IN FIRE
15,000 PSI
ALLOWABLE BOLT LOADING PERMITTED BY API-ASME CODE FOR UNFIRED PRESSURE VESSELS
75,000 PSI
ULTIMATE STRENGTH OF ASTM A-193 B-8 BOLTS
101,000 PSI
CALCULATED ACTUAL BOLT LOADING
ACTUAL NUMBER OF BOLTS 3
NUMBER OF BOLTS REQUIRED 20

Fig. 3.

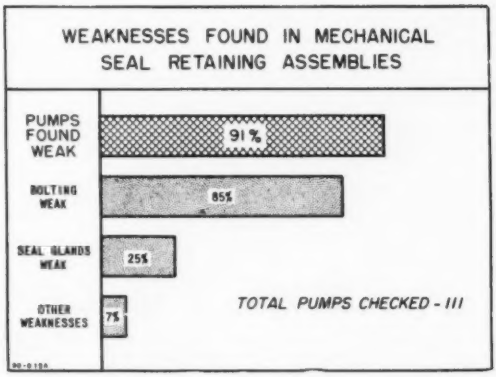

Fig. 4.

many times too weak properly to yield and seat the normal compressed asbestos gasket installed. In addition, a seal-gland plate similar in thickness and diameter to a packing gland is usually far below the design standards for the stresses imposed by a gasketed joint under internal pressure, and such a seal gland is very often not sufficiently rigid to avoid misalignment of the seal face.

During 1950, failure of the bolting retaining the mechanical seal on a propane pump caused a large gas release and flash at one of the light-ends plants. Fortunately no personnel were injured. The pump involved in this fire was a 9-stage, 600-g.p.m. centrifugal unit with a suction pressure of 350 psig. and a discharge pressure of about 1,200 psig.

The soft packing originally installed was replaced by the field mechanical forces with a mechanical seal utilizing the practices outlined in the preceding paragraphs. The throat bushing which is normally found in such installations (see Fig. 2) was left out of this pump. With the mechanical seal and bushing out, an annular opening of $\frac{1}{4}$-in. width existed around the pump shaft through which a flow in excess of 72,000 bbl. daily could be expected with 350 psig. differential pressure.

Following the fire, calculations indicated that to properly seat the wide full-face compressed asbestos gasket installed between the seal gland and the pump, the three 18-8 chrome nicket studs would have been under stress of 101,000 psi. The ultimate tensile strength of this type of stud is 75,000 psi. Instead of the 3 bolts actually installed on this pump, 20 bolts of the same material and size would have been necessary to lower the bolt stress to within the maximum allowable limit. (See Fig. 3.) This retaining assembly was redesigned utilizing a seal gland with a raised face, a narrower gasket, and five high-strength bolts (A.S.T.M. Specification A-193 Grade B-7).

Preliminary engineering checks of the retaining assemblies on other mechanical-seal installations were made soon after the fire. These checks indicated that virtually all of the mechanical-seal installations were below the minimum standards given in the flange design section of the A.P.I.-A.S.M.E. Code for Unfired Pressure Vessels, 1943 Edition.

Checking Program

On the basis of these findings, a program for checking, redesigning, and modifying all seal-equipped pumps was begun. The initial design practices followed in this work called for the use of high-strength bolting, raised-face gasket surfaces, throat bushings, and seal-gland plates and bolting sized in accordance with the requirements given in the A.P.I.-A.S.M.E. and A.S.M.E. Codes for Unfired Pressure Vessels.

A minimum of three bolts attaching the seal gland to the pump case was considered desirable to provide for failure of one bolt without complete failure of the joint, but it was found impractical to adhere to this rule because of the many horizontally split case pumps with two bolts. Major alterations to the cases of these pumps would be necessary to provide more than the two existing bolts. In actual practice two bolts are allowed for the redesign of existing installations if the required total bolting strength is provided.

Bolt loads are determined from standard formulas which are given in both the A.P.I.-A.S.M.E. and A.S.M.E. Codes for Unfired Pressure Vessels. The first of these formulas determines the bolt load necessary to withstand the hydrostatic end force due to internal pressure and that required to maintain a compression load on the gasket sufficient to assure a tight joint.

The second formula determines the initial bolt load necessary to seat the gasket under atmospheric conditions in the absence of internal pressure. The larger of the values determined from these formulas is used for establishing required bolting. In most pump installations the second formula governs. This formula contains a gasket-unit seating-load factor which directly affects the size and number of bolts required. The A.P.I.-A.S.M.E. code (1943 edition) suggests a value of 4,500 psi. for this factor for all thicknesses of compressed asbestos gaskets, while the later editions of the A.S.M.E. code suggests graduated values depending on thickness and beginning with 1,600 psi. for $\frac{1}{8}$-in. thick gaskets. Because it is difficult to provide sufficient bolting area on most pumps and because the graduated values represent the latest opinions on the subject, the more liberal A.S.M.E. graduated values are used for bolting calculations.

Decision to use high-strength bolting material necessitated the determination of proper thread engagement for dissimilar metals. Frequently, the pumps on which B-7 studs are used are cast iron, brass, or other low-strength materials. With these metals it was found that the commonly used depth for tapped holes of one nominal bolt diameter made the pump threads considerably weaker than the bolting.

To insure that the pump threads will be at least as strong as the bolting, the required depth for the various metals used is determined by equating the tensile strength of the bolt to the shear strength of the threads of the weaker material. These depths are converted to nominal bolt diameters for use in the shop.

In instances where it is suspected that excessive stresses may be set up in the pump case by larger bolting, the actual stresses involved are calculated to insure that they are within the limits of the strength of the pump case material. Most of these instances have involved the possibility of the through-bolt in an eye-bolt assembly shearing the pump case.

At the time the redesign program was begun many thin seal-gland

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plates were known to have bent sufficiently to cause gasket leakage or carbon-insert failure. This problem was particularly evident on two-bolt, oval-shaped seal-gland plates. Exact amount of bending which will cause carbon-insert leakage or failure is difficult to determine. However, some practical and quick means had to be found to establish seal-gland thicknesses of sufficient rigidity to prevent leakage or failure. The method which was chosen at this refinery is an empirical one which has proved practical to date. The seal-gland thickness is determined by using the thickness through the hub of a standard slipon flange which is of the same series rating as the pump discharge flange and which has a bolt circle diameter nearest that of the seal gland.

Another question which arose in the early stages of the program was the desirability of the auxiliary stuffing box and gland which is often provided for light-hydrocarbon pumps. This stuffing box and gland is installed on the outboard side of the seal-gland plate and is designed for use with a venting system to vent off any hydrocarbon which may leak past the seal. This refinery has found the packing in auxiliary stuffing boxes difficult to keep lubricated and in most cases substitutes a close-fitting bushing which will retard the hydrocarbon flow in the event of complete carbon-insert failure rather than vent leakage. This bushing is in addition to the normal throat bushing.

A design standard covering all of the specific parts of retaining assembly design was written and is being used for the modification of existing pumps and for the purchase of new pumps. It is appreciated, however, that the design of retaining assemblies for mechanical-seal installations is in the development stage. Revisions to this standard will be made as further study and plant experience indicate that they are necessary.

At the present time approximately 111 pumps have been redesigned and modified. Ninety-one per cent of these pumps were found to be underdesigned in some respect. (See Fig. 4.) Approximately 85 per cent of the installations checked have required more bolting strength and about 25 per cent have required thicker seal glands. Horizontally split case pumps with two eyebolts have proved the most difficult to redesign because the use of more than two bolts is usually impractical and the required size eyebolt sometimes necessitates enlarging the space in the pump case for the eye. Compressed asbestos gaskets $\frac{1}{8}$ in. thick are generally used in conjunction with a raised face for attaching the seal gland to the pump case, although metal-clad gaskets and confined gaskets have been used in some instances. Several pumps with mechanical seals have reconverted to soft packing because the use of a mechanical seal did not justify the cost of the excessive corrective measures necessary.

Insuring against retaining assembly failure cannot end with the providing of proper design. The mechanics who regularly assemble and disassemble these installations must have enough knowledge of the retaining-assembly problem not to weaken the installation by the substitution of different materials or different size parts. To meet this problem, this refinery has given all mechanical-seal redesign information wide distribution particularly among the mechanical forces. In addition the engineers handling the redesign calculations work closely with the shop mechanical people on all seal alterations and have assisted in the field on many occasions. Experience indicates that the mechanical forces recognize the importance of proper seal installations and are willing to call in the design engineers before making any change.

The weaknesses existing in mechanical-seal retaining assemblies at this refinery were pointed out by a serious bolting failure. As a result of this failure, other refineries of Esso Standard have checked many of their pumps and discovered the same underdesigned installations. It is probable that such weaknesses exist in plants of other companies where soft packing has been replaced by mechanical seals without complete engineering checks. Further failures can be prevented by the discovery and correction of these weaknesses.

Gulf Builds 63,000-Bbl. Cat Cracker

(Continued from page 81)

place. Steam injection is normally used in each carrier line and provision has been made to introduce large quantities of steam in case of emergency.

Reactor features.—A cylindrical midsection, an inverted-cone bottom-section, and a hemispherical upper section make up the general outline of the reactor. Contained within are a stripping section, a catalyst grid, and cyclones for catalyst recovery. A large overhead vapor line carries hydrocarbon vapors to the fractionator and the bottom standpipe carries spent catalyst to the carrier line for passage to the regenerator. This spent-catalyst carrier line with its 105-in. diameter is actually large enough to drive a passenger automobile through!

The reactor has an approximate over-all height of 69 ft. and a maximum inside diameter of 39 ft. Cracking takes place within the reactor in which the catalyst bed is maintained above a grid.

The spent catalyst enters an internal stripping section located in the bottom section of the reactor. This varies somewhat from smaller units which had the stripping section located directly beneath the reactor rather than within the reactor. Stripping steam is furnished into the stripping section.

Catalyst enters the stripping section through slots in the lower section located just above the grid. Vapors from the stripping section are vented into the upper section of the reactor where they join with outgoing hydrocarbon vapors.

A differential between the catalyst levels in the stripping section and reactor serves to restrict flow in one direction between the two sections. Stripped catalyst is drawn out through standpipe at base of reactor for entrance into the regenerator carrier line.

As in the regenerator standpipes, a slide valve controls the flow of catalyst through the reactor standpipe. The catalyst flows from the standpipe into the carrier line where it joins the air from the blowers. This air fluidizes the catalyst for transit to the regenerator.

Flow process.—Fresh feed into the cracker amounts to 47,000 bbl. per stream day. To this is added 15,325 bbl. of heavy cycle oil and 1,175 bbl. of slurry recycle from the fractionator bottoms. Overhead hydrocarbon vapors from the reactor are broken down into five components in the fractionator, two of which are the heavy cycle oil and slurry recycle. Decanted oil and light cycle oil are taken off as products.

Hydrocarbon distribution.—Fractionator overheads are condensed and gathered in a distillate accumulator. From the accumulator distillate is sent to the absorber-stripper of the gas-recovery system, and wet gas is compressed and the liquid-gas mixture is processed in the absorber-stripper. Rich oil from the absorber stripper is stripped in the lean-oil still to produce heavy catalytic gasoline. Overhead from the still passes through a debutanizer and depropanizer from which are obtained debutanized light catalytic gasoline, butane-butene, and propane-propene.

Part of the butane-butene stream is sent to the alkylation unit for conversion to alkylate while the rest is sent to the nearby plant of Neches Butane Products Co. where it is used in the production of butadiene, an important ingredient of synthetic rubber.

Other cat crackers.—The fluid catalytic cracking unit is the third to be built at the plant and the first of its type here. A Houdry fixed-bed, 10,000-bbl. per day unit was the first catalytic cracker to be installed at the refinery. The catalyst used is a synthetic pellet type which is maintained in six fixed beds and working on a cycle arrangement whereby two units are used as reactors and the others are being regenerated and prepared for their reaction cycle.

The second crackers to be built were three Thermofor catalytic cracking units of 28,000 bbl. per day total capacity. They use a natural-clay pellet type catalyst and were the first moving catalyst bed-type cracking units to be built by Gulf. Bucket-type elevators convey the spent catalyst from the reactor to the regenerator.

Started in 1901.—The Gulf refinery was first constructed as an experimental plant in 1901 when it contained one 100-bbl. round still and one 375-bbl. horizontal still.

Well Logging in the Spraberry

(Continued from page 96)

normal invasion effects are eliminated.

n = The saturation root used in calculating water saturations.—This root is approximately 2 for clean sands, but is less than 2 if a sand contains shale. Since most Spraberry sands do contain shale, a value less than 2 (from 1.5 to 1.9) is used.

Figs. 6 and 7 illustrate the application of quantitative analysis for water saturation determinations in the Spraberry, Pembrook field. Fig. 6 displays the logs of two zones, one water bearing and the other oil bearing. The better sand developments in this particular field are known to have a good porosity averaging about 18 per cent.

Fig. 7 shows the use of nomograms in the solution of the equation

$$S = \sqrt[n]{R_w / R_t} \times 100$$

The log of the oil well has a minimum value of 6.0 ohm m^2/m on the induction log for the main sand bodies. Taking this value of 6 ohm m^2/m as R_t and applying it to the nomogram together with values of $R_w = 0.8$ ohm m^2/m (for good porosity) and $n = 1.9$ (see above), a maximum water saturation, S, of 34 per cent is obtained. This well was Hydrafraced from 7,235 to 7,309 ft. and flowed 215 bbl. of oil per day with no water.

The log of the well, which tested water, shows a value of 2.0 ohm m^2/m in the sand from 7,880-90 ft. Applying values to the nomogram as before, a water saturation of 62 per cent is obtained. After Hydrafrac, this well produced 200 bbl. of fluid per day, 97 per cent of which was salt water. It is thus seen that once sufficient data are available, some of which must be arrived at empirically, good quantitative results can be obtained.

Detailed Gamma Ray Curve—Possibility of New Developments

Recently there has been a demand for a gamma ray curve, showing great detail in the Spraberry. Fig. 8 is an example of such a curve run on two wells in Pembrook field. The wealth of detail is readily apparent as thin breaks of the order of 1 ft. are clearly shown. This new gamma-ray curve will be available as standard equipment on all trucks working in the area in the near future.

Also numerous inquiries have been made recently concerning the possibility of using well-logging methods to determine fracture characteristics in situ. Earlier in this paper it was stated that the productivity of a well in the Spraberry is dependent on the size of the fractures crossing the drill hole. To date it has not proved feasible to determine the size of the fractures, and hence well productivity, by either the visual inspection of cores or by their analysis. Logging methods currently being used likewise offer no information on the development of fracturing. The acute awareness of the problem is causing the vigorous study of all logging methods, however, and it is hoped that a solution will be found.

Conclusions

Many new problems face the oil industry in the development of the Spraberry section. These problems have resulted in the use of a number of new exploration and production techniques and in the revision of others. The use of the gamma ray-induction log combination, as a primary logging method, is one such change. Experience with the method to date indicates that it is very useful as an aid in obtaining drill hole characteristics as follows:

Detailed correlation.—Gamma ray-induction logs give excellent formation correlations, both short and long range, and permit reliable identification of the various lithological types.

Qualitative estimates of porosity.—Proper use of the gamma-ray curve, complemented by the induction log, makes it possible to not only determine the rock type, but to give a reasonable estimate of its porosity.

Semiquantitative estimates of water saturation.—By assuming average porosity values on the better developed sand sections, it is possible to obtain reliable water saturation values. These values are not as accurate as those obtained with conventional electrical logs. They are more dependent on empirical data and will improve as additional data are accumulated.

Gamma ray-induction logs are thus of primary importance to the Spraberry operator because the physical data obtained from them can be used in estimating the oil in place in the reservoir. Such estimates are essential to the efficient development of any oil reserve and are particularly so to the Spraberry because of the peculiar economic problems involved.

Acknowledgment

The authors wish to thank M. P. Tixier, Frank Millard, and John Kellough, of Schlumberger Well Surveying Corp., for their assistance in preparing material for this presentation. They are also deeply appreciative of the core information and logs provided by the oil companies, which were used in the preparation of the examples.

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Operation of Orco Process

(Continued from page 87)

which might be acid soluble, there remained a portion which could scarcely be accounted for other than as unsaturated hydrocarbons.

As judged from frequent Orsat determinations the portion of produced gas believed to be unsaturates increased from zero in the gases when no carbon dioxide was present, to a maximum of 20 to 23 per cent unsaturates in the hydrocarbon fraction at the peak of gas production; dropped to 4 or 5 per cent in August 1951; and to zero unsaturates again in samples taken in October 1951. Mass spectrographic analysis was unobtainable until August 1951, when the unsaturates were found, by the laboratory of a large oil producer, to total 3.5 per cent of the hydrocarbons present (mostly butylenes and pentylenes) and in October, a similar type of analysis by the Bureau of Mines showed the absence of any unsaturates. An analysis taken from another Orco process flood prior to peak oil production but while the produced gas contained 84 per cent carbon dioxide, showed that 7.5 per cent of the hydrocarbon fraction were butylenes and 2.4 per cent were pentylenes.

4. On the lease on which the test area is located no substantial amount of natural gas is produced with the oil. The gas content of the oil is stated to be about 30 cu. ft. per barrel. As indicated by Fig. 6 the production of hydrocarbon gases rose to a peak of 500 cu. ft./day and over the 2-year period of the test amounted to about 200,000 cu. ft. This is equivalent to 310 cu. ft. per barrel of oil produced. Not only was this unexpected amount of hydrocarbon gases produced, but these gases showed a surprising absence of any substantial amounts of methane. Further it may be significant that carbon monoxide was found in amounts as high as 2.6 per cent of the total gas—about 1 part of monoxide to 24 parts of carbon dioxide.

BOOKS

SPINDLETOP—WHERE OIL BECAME AN INDUSTRY. Published by Spindletop Fiftieth Anniversary Commission, Beaumont, Tex. 201 pp. $3.

This volume constitutes the official proceedings of the fiftieth anniversary program commemorating the discovery of Spindletop oil field at Beaumont, January 10, 1901. The book was compiled and published under the supervision of Spencer W. Robinson, executive director. It is copiously illustrated, and handsomely printed, and will serve as a souvenir memento of this important occasion in the history of the petroleum and natural-gas industry.

PLANT LAYOUT—PLANNING AND PRACTICE, by Randolph W. Mallick and Armand T. Gaudreau. Published by John Wiley & Sons, Inc., 440 Fourth Avenue, New York. 319 pp. $7.50.

Since only one-half of all labor in a manufacturing plant does the productive work of processing and assembling material into a product, and the other half is expense labor engaged in service operations such as receiving, storing, transporting, inspecting, shipping, repairing, and office work, recognition of the growing need for a scientific approach to plant-layout problems and design is clearly evidenced. In setting out to cover the unbounded field of plant-layout engineering within the confines of one book, the authors centered their attention on salient aspects of layout problems encountered in more than 25 years of actual experience in scores of manufacturing plants throughout the country. The book has been written primarily with the administrative executive and plant engineer in mind, and was developed as a quick guide for senior and junior engineers and as a reference work for engineering colleges and schools of business administration.

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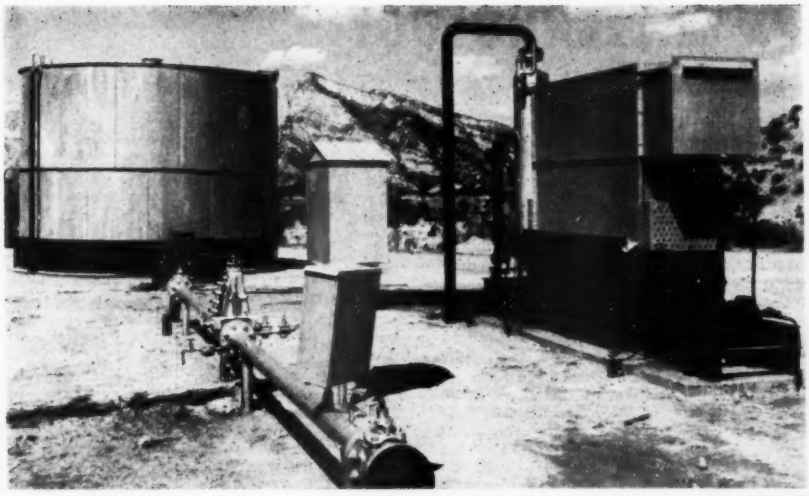


Two views of the skid-mounted gas cooler recently installed in a Los Angeles County oil field. Electric motors drive fans to induce an upward flow of air through the coils. Circulating water pumps are also electrically powered. A temperature controller automatically adjusts the position of the louvers on the air inlet while a float-operated controller dumps the trap whenever the liquid level builds up to about one-third of the trap's height.

Skid-Mounted Gas Cooler

by D. H. Stormont
West Coast District Editor

Unit designed to cool 2,500 M.c.f. daily from 115 to 85° F., or to within 10° of wet-bulb temperature

IN the Castaic Junction area 35 miles northwest of Los Angeles, an operator was faced with the problem of lowering water and condensable-liquid content of wet field gas to a point where it would be acceptable by the gas purchasing company.

Currently the field has five oil wells and a gas-condensate producer, with a total gas output of about 1,000 M.c.f. daily. With a development program of one well per month planned during the near future, it would be some time before installation of an absorption-type natural-gasoline plant could be justified. To care for the field's immediate needs, therefore, a skid-mounted gas cooler was installed earlier this year.

Operating at 350 psi., the unit was designed to handle 2,500 M.c.f. of gas daily and to cool this volume from about 115° F. to 85° F., or to within 10° F. of wet-bulb temperature. Any liquids knocked out in the cooling phase are trapped in the separator, from which they are automatically dumped into a line leading to a nearby tank battery. A reverse-acting temperature controller automatically adjusts the volume of air pulled into the cooler in accordance with gas temperatures.

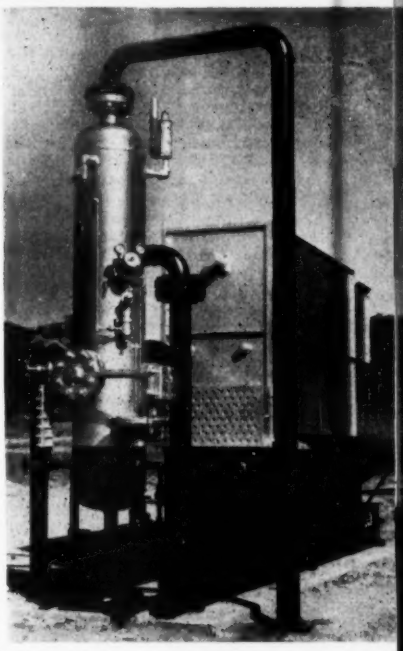
The unit, which was designed by Industrial Engineers, Inc., Los Angeles, operates as follows:

Well gases enter a header in the cooling section and flow through four passes of U-bend tubes. Cooling is effected through a series of water sprays mounted above the tubes, and the upward flow of air induced by exhaust fans mounted in the top section of the unit. Chevron-type baffles between the fans and sprays strip out most of the moisture carried upward by the cooling air.

Cooling water, after falling down over the coils, is collected in a basin provided in the bottom of the unit. From there it is recirculated over the coils by an electric-motor-driven pump mounted on the skid base. To prevent excessive buildup of solids in the water, a bleed provided on the discharge side of the pump automatically removes some of the water from the system. A float-operated valve permits addition of makeup water as needed.

Air is introduced through an intake below the coil section. The volume drawn in is controlled by adjustable louvers, whose position is regulated by the temperature controller acting through a diaphragm-operated motor valve and a mechanical linkage. Should atmospheric temperatures drop to 60° F. the shutters begin to close, but above that temperature they are wide open.

Water for the unit is obtained from a nearby 1,000-bbl. tank which furnishes water to the entire field, gravitating to the gas cooler in response to the makeup water float control. Normal makeup-water requirements are from about 5 to 10 bbl. daily.



The cooled gas enters the trap, of 1,000 psi. test pressure, where baffles strip out the entrained liquids. The stripped gas then exits overhead and after being metered is led to the line of the gas company. The float-actuated liquid-level control automatically dumps the trapped liquids whenever the level builds up to about one-third of the trap's height.

QUESTIONS on TECHNOLOGY

by W. L. Nelson
Consulting Engineer

Fuel-Oil Specifications—Bunker C and B

Can you direct us to the best source for obtaining the prevalent specifications on No. 1 through No. 6 fuel oils and Bunkers A, B, and C fuel oils? B. E. W.

The yearly publication of the American Society for Testing Materials, 1916 Race Street, Philadelphia, entitled "Petroleum Products and Lubricants," carries the current Specification D396 which pertains to fuel oils. The same requirements appear in the Federal Specifications VV-O-326 (revised June 5, 1947). The heavy-fuel-oil specifications, since the year 1918, were examined on the Questions on Technology page of The Oil and Gas Journal of July 27, 1946, and it is believed that national agencies have not formally used the terms Bunker B or C since 1933, and the last record of a Bunker A specification was for the year 1927.

Nevertheless, and although recent specifications do not appear to be available, the name Bunker C persists in company specifications and in connection with fuel-oil sales at ports. At least one major company, in contracts written in 1950, referred to the 1927 Specification (U. S. Bureau of Mines Technical Paper 323B, Standard Specification No. 2-d, as revised October 21, 1927) in stating the properties of Bunker C fuel oil. The most significant requirements of these specifications are compared in Table 1 with current A.S.T.M. specifications.

It would appear from Table 1 that A.S.T.M. No. 6 fuel oil and Bunker C fuel are the same but the properties required by some purchasers for bulk shipments at ports are actually somewhat as follows:

A.P.I. gravity, min.	10.5
Flash, °F. min.	150
Viscosity Furol at 122, max.	175
occasionally	125
B.s. and w., max.	2.0

Although the tabulated requirements here are expected by many purchasers, National Petroleum News and Platt's Oil Price Handbook which quote prices on Bunker C fuel oil (as well as A.S.T.M. No. 6) state:

"Bunker C is an oil-industry term used to designate a residual fuel used principally for bunkering ships, and there are no standard specifications for it by that name. Bunker C is comparable to a No. 6 fuel, and, in the vast majority of instances will meet No. 6 specifications . . ."

It is undoubtedly true that substantially all fuels sold as Bunker C will meet the specifications of No. 6 fuel, because in common practice Bunker C is lighter or thinner than A.S.T.M. No. 6 fuel.

TABLE 1—HEAVY-FUEL-OIL SPECIFICATIONS*

	Date	(°F.) Flash, min.	Viscosity, Furol seconds, max.	Water and sediment, max. per cent
Bunker A	1927	150	100 at 77° F.	1
A.S.T.M. No. 5	1950	130	40 at 122° F.	1
Bunker B	1927	150	100 at 122° F.	1
Bunker C*	1927	150	300 at 122° F.	2
A.S.T.M. No. 6	1950	150	300 at 122° F.	2

*The use of the term Bunker C in the trade is not necessarily the same as shown here.

Flash Point at High Altitudes

Are there any specific data available on the variation of Cleveland open-cup flash point at high altitudes? We have in mind the flash point of 350° flash stock at 100 ft. and at 5,300 ft. elevation.—O. B. B.

There are probably no experimental studies of the effect of altitude on flash point but there are basic scientific principles that should lead to an understanding of the magnitude of the effect of altitude.

Flash point occurs at sea-level barometric pressure when the liquid material exerts a vapor pressure of about 1 mm. for lube stocks or about 5 mm. for lighter stocks such as kerosine. This has been discussed many times on this page: *"Flash Tests Useful for Judging Applications of Light Oils," September 1, 1938, page 42; "Estimating Flash Point," October 13, 1949, page 125; and "Blending Scarcely Improves Flash Point," June 14, 1951.* Thus, the 350° flash lube stock has a vapor pressure of about 1 mm. at a temperature of 350° F.

The lower explosive limit (volume per cent in air) of lube oils is quite low, being 0.13 per cent or perhaps as high as 0.2 per cent. The ability of the lube oil to project vapor into the air is affected primarily by temperature (not by pressure or barometric pressure) and hence the amount of lube-oil vapor emitted at the high altitude remains the same, but the air is less dense at the high altitude. This results in a richer, more explosive mixture (for a fixed temperature) at a high altitude than at a low altitude. The magnitude of the difference can be computed as shown in Table 1.

TABLE 1
Approximate Effect of Altitude on the Flash Point of Light Lube Oils

Altitude—	Barometric pressure (mm.)	Mm. vapor pressure required to make explosive mixture*	Approximate flash temp.†
Sea level	760	1.0	350
5,000 ft.	633	0.83	344
10,000 ft.	532	0.7	338
15,000 ft.	429	0.56	330
20,000 ft.	362	0.48	325
30,000 ft.	253	0.33	314

*Based on a vapor pressure of 1 mm. at sea level for the lower explosive limit of 0.1315 volume per cent. †The temperature required to cause the vapor pressures shown in the column just ahead.

Although Table 1 is admittedly approximate, it should show somewhat the correct trend. It should be noted that vapor pressures of 1.5 or even 2.5 mm. can be used in the computations rather than the 1 mm. used in Table 1 without making significant changes in the flash temperatures that are computed. Of course, Table 1 is based on the assumption that the mechanism of the Cleveland cup test remains the same at all altitudes and that inflammability or explosive limit is not affected in some strange way by low pressures.

Absorber Computations

How can we estimate the amount of absorption that will occur with various amounts of oil circulation?—F. C. M.

The amount of absorption that will occur is not a simple relationship and hence it must be recommended that the situation be studied in detail using the general methods outlined on pages 734-743 of the Third Edition of Petroleum Refinery Engineering (McGraw-Hill Book Co., New York, 1949) or similar references.

However, below 60 per cent absorbed, the following relationship is reasonably exact for a 16 (actual) plate absorber:

$$\text{Per cent absorbed (below 60 per cent)} = 0.0128\ GP/p$$

in which "G" is gallons circulation per 1,000 cu. ft. (60° F., 1 atm.) gas, "P" is the absolute pressure in the absorber (psi.) and "p" is the vapor pressure of the hydrocarbon being considered. This is applied to each of the hydrocarbons, and is usually satisfactory for ethane, propane, or propylene because these are usually absorbed in amounts less than 60 per cent of the amounts of them in the feed. It usually is not applicable to the butanes, butenes, pentane plus, etc., which are nearly totally absorbed and require two or three times as much oil circulation as the formula indicates.

CORROSION and its control

Laboratory Corrosion Tests

ANY brief discussion of laboratory tests of materials for use in corrosive media must necessarily be very general in terms. It is not intended to treat fundamental research, but merely the conducting of tests to select from available metals and alloys those which show sufficient resistance to corrosion in a given environment to justify their use in construction; or, more dependably, to justify further investigation under conditions more closely approximating actual use.

It is virtually impossible to conduct laboratory tests in such a way as to duplicate service conditions exactly; hence the results can never be taken as final or conclusive. On the other hand, such tests can be conducted more readily than service tests, and if the process being investigated pertains to a plant which is not yet in operation, there is no choice but to use laboratory methods.

Among the factors which must be controlled are: relative volume of corrodent to area of specimen; velocity of fluid with respect to specimen; temperature; aeration, or concentration of dissolved gases of any kind; and cyclic variations of any of these factors, or of such factors as immersion.

Use Thin Specimens

The loss in weight will usually be the measured quantity; it is therefore advantageous to use thin specimens, so that a measurable loss in weight will be obtained in a reasonable period of time. A number of specimens of each material under test should be used for two reasons; to insure statistical accuracy, and to permit the plotting of a time-corrosion curve, in order to detect any significant changes in corrosion rate with time. Such changes are quite common, and no material should be rejected solely on the basis of a high initial rate of attack. If the test is carried to the point of complete perforation in one or more specimens, care must be taken not to be deceived by an apparent decrease in corrosion rate, caused actually by the decreased area of specimen exposed.

Fluid velocities should approximate those expected in service conditions; if time and facilities allow, tests should be run at several velocities, above and below those to be encountered, for this factor frequently introduces major changes in the process and rate of corrosion. Temperature should be varied in a similar manner for similar reasons.

Unless there is some particular reason to limit the volume of solution used, in an attempt to duplicate service conditions, a minimum of 250 cc. per sq. in. should be used; a greater quantity is safer, especially if the attack is severe, since an increased concentration of corrosion products may seriously affect the rate.

Dissolved Gases

The question of dissolved gases, particularly oxygen, requires some care for its proper handling. It is exceedingly difficult to maintain any specific degree of saturation except that of complete saturation. Consequently, if the desired conditions require some lesser degree, it is most easily obtained by bubbling through the liquid corrodent a controlled mixture of oxygen and an inert gas such as nitrogen. If, for example, approximately 10 per cent saturation with oxygen is desired, then a mixture of half nitrogen and half air (20 per cent oxygen) is used. If a completely oxygen-free solution is sought, then purified nitrogen is used.

As with the plant tests described previously, the results may be reported either in terms of weight loss (milligrams per square decimeter per day) or, if the corrosion is uniform, in penetration rate (inches per year). In either case, it must not be assumed that the rate is constant with time, but the results should be presented as time-corrosion curves.

There is room for a great deal of ingenuity in the design and carrying out of laboratory corrosion tests. Yet, with all the careful control which can be exercised, it remains unfortunately true that such tests are never very reliable. They may be used for preliminary studies; in fact they must be used if any work is to be done at all during the preliminary stages of a planned construction. Following the first set of laboratory tests, in which a great variety of materials are tried, there should come a second set, with more elaborate equipment so as to approximate service conditions to a greater degree. In this second set, all of the materials which showed promise in the first set are given tests which are necessarily more prolonged and more expensive.

The second set must be followed by a third, and a fourth, and so on; each successive set of tests conducted with conditions more closely approximating those to be encountered in the final operations. Final decisions may then be made on the basis of plant tests conducted in connection with pilot-plant operations, or may even have to be deferred until the actual plant is in operation, with materials tested by specimens or by actual substitution.

Testing New Materials

Laboratory tests also have a valuable exploratory function in the testing of new materials which become available after a plant is in operation. Under these circumstances, they occupy a preliminary position, to be followed by plant tests, and ultimately by substitution runs. In all of the applications to which laboratory tests may be put, it must always be remembered that no material may ever be conclusively accepted for a given service on the basis of laboratory tests, and that there is some danger of overlooking an obscure factor even in the rejection of a material on such a basis.

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Permeability Distribution and Flood History—2

IN a previous discussion of permeability distribution and its effect on flood history it was assumed that the flood-front advance in a uniform bed was directly proportional to the permeability. Now, the development will be presented using the assumption that the flood advance in a uniform bed is given by a more general equation which includes the consideration of mobility ratio as well as permeability.[1] (See Engineering Fundamentals No. 467 for the development of this equation.)

The equation which expresses the fractional travel x_j/L in a bed of permeability k_j when the flood front in the bed of permeability k_j has just reached the total distance L is:

$$\frac{x_j}{L} = \frac{1 - [k_w/k_j\,(1/\gamma^2 - 1) + 1]^{1/2}}{1 - (1/\gamma)} \quad (1)$$

where γ is the mobility ratio equal to $k_w\mu_o/k_o\mu_w$.

The equation which expresses rate of fluid flow, q_j, in a bed of uniform permeability k_j when the fractional flood advance is x_j/L is:

$$q_j = \frac{k_w/k\; k_j\,(P_2 - P_1)\,Wh_j}{\mu_w L\,[(x_j/L)\,(1/\gamma - 1) + 1]} \quad (2)$$

Consider now n different noncommunicating parallel beds of rock, of permeability k_1, k_2, k_3, ... k_j, ... k_n. Assume that the flood front has just reached the distance L in bed of permeability k_j. The total cumulative oil produced at this time is all that from beds of permeability greater than k_j, that from bed j, and a fractional amount from each of the beds of permeability less than k_j. These fractional amounts will depend upon how far the flood front has advanced in each bed. These amounts of cumulative oil are:

1. From bed j and those of higher permeability, $\delta W L \Delta S_o \sum_{1}^{j} h_j$.

2. From beds of lower permeability, $\delta W \Delta S_o \sum_{j+1}^{n} h_j x_j$.

Where W is the common width of the beds, δ is their common porosity, ΔS_o their common amount of oil replaced by water, and i represents any individual bed.

Inasmuch as x_j is given by Equation 1 substitution can be made in the above expression for cumulative oil so that:

$$\text{Cumulative oil} = \delta W L \Delta S_o \left[\sum_{1}^{j} h_j + \frac{\sum_{j+1}^{n} h_j}{1-(1/\gamma)} - \frac{1}{1-(1/\gamma)^{1/2}} \sum_{j+1}^{n} h_j\,([k_j/k_j]\,[1/\gamma^2 - 1] + 1)^{1/2}\right] \quad (3)$$

At the same time that bed j just begins to produce water (the cumulative oil is given by Equation 3) the total rate of water production is that from all beds of permeability greater than k_j, plus that from bed j. This total water rate is found by summing Equation 2 written for all beds involved, thus:

$$\text{Water rate} = \sum_{1}^{j} q = \frac{(k_w/k)\,W\,(P_2 - P_1)}{\mu_w L\,(1/\gamma)} \sum_{1}^{j} k_j h_j \quad (4)$$

The total rate of oil production at this same time is the sum of the rates from all beds of permeability lower than k_j. This total oil rate is:

$$\text{Oil rate} = \sum_{j+1}^{n} q = \frac{(k_w/k)\,W\,(P_2 - P_1)}{\mu_w L} \sum_{j+1}^{n} \frac{k_j h_j}{2 - [(k_j/k_j)(1/\gamma^2 - 1) + 1]^{1/2}} \quad (5)$$

The water-oil ratio is, therefore, Equation 4 divided by Equation 5:

$$\text{W.O.R.} = \gamma \sum_{1}^{j} k_j h_j \Big/ \sum_{j+1}^{n} k_j h_j \,/\, (2 - [(k_j/k_j)(1/\gamma^2 - 1) + 1]^{1/2}) \quad (6)$$

Inasmuch as Equations 6 and 3 each apply to the time when bed j has just been flooded, the cumulative oil is related to the water-oil ratio by these equations. It will be noted when γ is unity, these equations reduce to those given in Engineering Fundamentals No. 468.

A calculation has been made with these equations and a mobility ratio of 10 using the same permeability distribution that was used to calculate the simpler history given in Engineering Fundamentals No. 468. Tabulation is not made because of the large number of terms appearing in each summation as the permeability of the jth bed advances. The calculated points are plotted in Figs. 1 and 2 along with the calculated curve for the case when the mobility ratio was one.

It is to be noted that the mobility ratio plays the most important part in determining the amount of recoverable oil if the flood must be terminated at low water-oil ratios. Of course, the mobility ratio exercises no control over the total amount to be recovered if the ratio is permitted to go to infinitely high values. As will be pointed out later, flooding at a high mobility ratio has the same effect as flooding a more heterogeneous formation. With mobility ratios higher than that indicated, the deviation between the two performance curves would be even more pronounced.

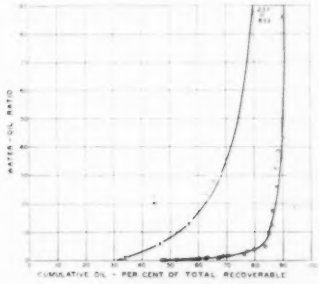

Fig. 1.

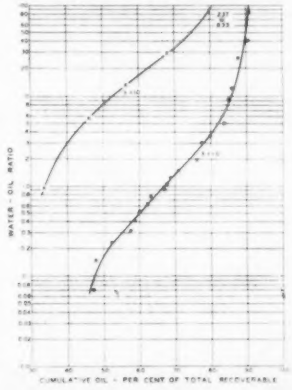

Fig. 2.

Reference

1. Dykstra and Parsons, Oil Recovery Prediction by Water Flood. Secondary Recovery of Oil in United States. 2nd edition. A.P.I., 1950.

Series by John C. Calhoun, Jr., Chairman, Petroleum Engineering School, Penn State College

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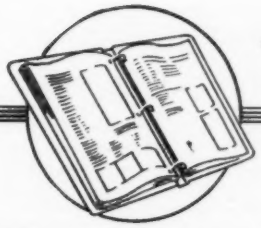

THE REFINER'S notebook

No. 101

Refinery-Control Applications And Measurement Developments

by V. V. St. L. Tivy*

THE four generally accepted and commonly used control functions are: on-off, proportional, reset, and derivative.

A rough-and-ready index of application of these control modes is made in Table 1.

As experience with automatic control grew, it became more widely appreciated that existing measuring elements were quite inadequate where high standards of control were required; also, with the more modern processes rather small differences in finite measurement became very significant. For example, where previously a variation of two or three degrees Fahrenheit was unimportant, nowadays one is often concerned with changes of 1° F.

*The Foxboro Co. Portion of paper presented at the petroleum mechanical engineering conference of the A.S.M.E. at Tulsa, 1951.

TABLE 1—REFINERY CONTROL APPLICATIONS

Mechanism	Usage	Typical applications
1. On-off	To operate alarms, shut-down devices and interlocks.	Furnace fuel shutoff on high temp.
2. Proportional	Used for the most simple control problems, most often pressure in vessels and pipes. Sometimes and often incorrectly, specified to save the extra cost of No. 3.	Pump discharge pressure. Pressure reduction in steam line.
3. Proportional + Reset	The general purpose controller. Used for most controls in the continuous processing industry. Should be used for:	
	1. All flow controls	Debutanizer reflux
	2. The more difficult pressure controls	Deisobutanizer
	3. The more important level controls	Depentanizer bottom
	4. The more simple temperature controls	Feed preheater to a tower.
4. Proportional + Reset + Derivative	Used for the most "difficult" control applications. Never on flow or level, seldom on pressure but generally on temperature.	Cracking coil outlet. Fractionating tower top temperature.

TABLE 2—MEASUREMENT DEVELOPMENTS

Device	Type	Improvements affecting control
		Temperature
Thermocouple Type Thermometer	Electronic	1. Increased speed of response. 2. Increased sensitivity to smaller changes in temperature. 3. All discontinuities eliminated (i.e., choppers, slidewires, standardizing, etc.)
Resistance Type Thermometer	Electronic	1. Increased speed of response. 2. Increased sensitivity to smallest changes in temperature. 3. All discontinuities eliminated (i.e., choppers, slidewires, etc.) 4. Increased stability of measurement.
Resistance Bulb	Capsule Type	1. Thermal transfer lags reduced materially. 2. Increased surface/mass ratio.
		Pressure
Mechanical Instruments	Spring	1. Increased torque of pressure spring. 2. Increased sensitivity to small changes.
Pneumatic Transmitter	Force Balance	1. Much narrower scale spans permitted. 2. Increased sensitivity to small changes.
		Flow
Differential Pressure Transmitter	Force Balance	1. Increased speed of response. 2. Increased sensitivity.

During the decade 1940-1950 the various mechanisms for measurement underwent a most complete evolution. It is interesting to examine briefly (Table 2) the devices which are more commonly used in the refinery and to note the direction in which the improvements have been made.

Response and sensitivity. — The important improvements, from the standpoint of automatic control, are in speed of response and sensitivity. The value of accuracy in measurement is well known; it is often difficult, however, to appreciate the need for a sensitivity of 0.1 per cent rather than 1 per cent, or a response time (time constant) of 1 second rather than one of 10 seconds, particularly where a process with general time lags of many minutes is involved.

Impressive results have been recorded when the new high-speed temperature controllers have been used in conjunction with super-responsive resistance bulbs. The latter are chosen, whenever possible, because of their stability of measurement; scale spans of 5° F. are easily accomplished with measurement accuracy of 0.1° F.; sensitivity to changes in the order of 0.01 per cent is usual. Control of fractionating columns is greatly improved when this type of instrument is used; over-all stability is much greater because the control system starts to correct for an upset much sooner than other less sensitive devices. Columns, which were very "temperamental" previously, can now be abused without loss of control because of this new measuring sensitivity.

Another interesting example of the benefits gained through use of faster measuring elements is shown in the control of tube stills. Formerly, it was found necessary to control outlet temperature by using a temperature controller to reset the control point of a flow controller in the fuel line. In many cases today it is sufficient to use a good electronic controller (electronic measuring system with pneumatic controlling mechanism) with derivative, operating the fuel valve directly. Better control results and one improved instrument now does the work formerly done by two.

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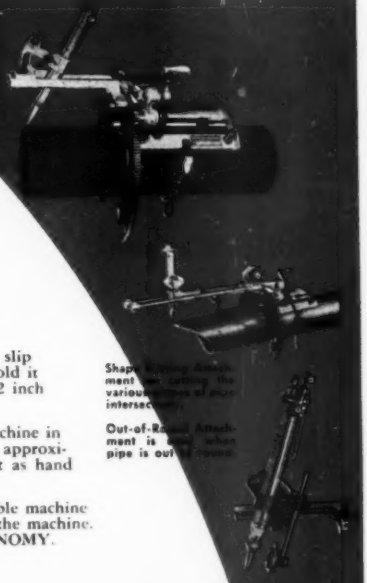

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Out-of-R[illegible] Attachment is [illegible] when pipe is out [illegible]

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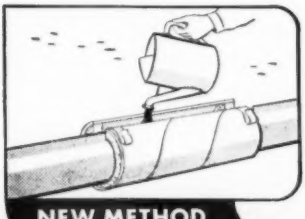

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Pipe-Line Construction

FOLLOWING is a tabulation of pipeline projects which are planned or under construction. Included are crude-oil, products, and natural-gas lines. This list is compiled from surveys made by The Oil and Gas Journal.

Crude-Oil Pipe Lines

Atlantic Pipe Line Co.—30 miles, 6-in., authorized, Brillhart Station to Ward County, Texas. Completion date 1-1-52.

Continental Pipe Line Co.—105 miles, 8-in., authorized, Rincon to northwest of Sullivan City on to Port Isabel, Tex. Completion date 1952.

Continental Pipe Line Co.—217 miles, 12-in., authorized, Wichita Falls, Tex., to Ponca City, Okla. Completion date 1952.

Derby Oil Co.—15 miles, 6-in., authorized Wichita to Bentley, Kans. Completion date 12-51.

Ohio Oil Co.—117 miles, 22-in., under way, Sheridan, Ind., to Lima, Ohio. R. A. Conyes, contractor.

Pan American Pipe Line Co.—27 miles, 26-in., Genoa to Texas City, Tex. Completion date 12-52.

Pan American Pipe Line Co.—40 miles, 14-in., Arden Station in Irion County to Eldorado Station in Schleicher County. 6-52.

Platte Pipe Line Co.—1,075 miles, 16-20-in., under way, Worland, Wyo., to Wood River, Ill. Completion date 1952.

Platte Pipe Line Co.—573 miles, 16-20-in., under way. Winchester, Wyo., to Brule, Neb. R. H. Fulton & Co. (Sections 1, 2, 3, and 4.—Section 1, 126 miles of 16-in., remainder 20-in.) A. A. Carrigan, spreadman at Casper, Wyo., field office.

Platte Pipe Line Co.—142 miles, 20-in., contracted, near Marysville, Kans., to Holdredge, Neb. Bishop & Lock (Section 5); H. LaQuey, spreadman.

Platte Pipe Line Co.—100 miles, 20-in., contracted, northern edge of Kansas. Rumsey Bros., contractor of Section 6.

Platte Pipe Line Co.—(Section 7). 274 miles, 20-in., Missouri River to Salisbury, Mo., and (Section 8) Salisbury to Mississippi River, under way, field office, Mexico, Mo.; B. C. Hall, spreadman; river crossing field office, Hartford, Ill., Dick Jernigan, spreadman.

Progress Pacific Pipe Line Co.—900 miles, 20-in., proposed, Permian basin, West Texas, to California.

Rancho Pipe Line System.—464 miles, 24-in., authorized, McCamey to Houston, Tex. Completion date late 1952. (Joint project with Sinclair Pipe Line Co., Pan American Pipe Line Co., Tidewater Pipe Line Co., Nantucket Pipe Line Co., and Phillips Pipe Line Co., with Shell Pipe Line Corp. handling construction and operation.)

Roosevelt Oil & Refining Corp.—22 miles, 4 and 6-in., authorized, St. Helens to Norwich, Mich.

Service Pipe Line Co.—19 miles, 16-in., under way, Raytown to Sugar Creek refinery, Mo. Sheehan Pipe Line Const. Co., contractor. J. W. Brown, spreadman at Raytown, Mo.

Service Pipe Line Co.—29 miles, 20-in., authorized; Drumright, Okla., to Humboldt, Kans.; 30 miles, 20-in., under way. Freeman to La Plata, Mo., G. G. Griffis Const. Co. Completion date 12-51. 24 miles, 10-in., contracted, Denton, N. Mx, to Wasson, Tex., Crossley and Hardy, contractor.

Shell Pipe Line Corp.—66 miles, 8-in., authorized, Gohlke to La Grange, Tex. Company crews. Completion date 1952.

Sinclair Pipe Line Co.—674 miles, 22-24-in., authorized; Drumright, Okla., to E. Chicago, Ind. Completion date 1952.

Sinclair Pipe Line Co.—150 miles, 24-in., contracted, Drumright-Cushing, Okla., area, to Humboldt, Kans. O. R. Burden Construction.

Skelly Oil Co.—38 miles, 8-in., under way, Lyons to Burrton, Kans. Rumsey Bros., contractor. Completion date 1-52.

Texas Pipe Line Co.—319 miles, 22, 12, 10-in., Louisiana Gulf Coast to Port Arthur, Tex., including 220 miles, 22-in., Houma, La., to Port Arthur, Tex.; 31 miles, 12¾-in., Houma to Cocodrie, La. Houston Contracting Corp. Completion date in summer 1952.

West Texas Gulf Pipe Line Co.—467 miles, 26-in., authorized, Colorado City to Wortham, Tex., 26-in.; Wortham to Sour Lake, Tex., 24-in. Completion date 10-52.

West Texas Gulf Pipe Line Co.—114 miles, 20-in., authorized, Wortham to Longview, Tex. Completion date 10-52.

Products Pipe Lines

Bell Oil & Gas Co.—150 miles, 6-in., planned, Ardmore to Drumright, Okla. (Includes 114 miles, 8-in.; 32 miles, 6-in.)

Buckeye Pipe Line Co.—370 miles, 8, 12, 16-in., authorized, Linden, N. J., via Allentown, Pa., to Auburn, Syracuse, Waterloo, and Rochester, N. Y. (Sections divided as follows: 75 miles, 16-in., 218 miles, 12-in., 77 miles, 8-in.) Start 1952, completion of 16-in., 1952, balance 1953.

Ohio Oil Co.—24 miles, 8-in., authorized, East St. Louis to Wood River, Ill.

Phillips Oil Co.—28 miles, 12-in., authorized, Sweeny to Freeport, Tex.

Phillips Pipe Line Co.—68 miles, 12¾-in., under way, Osawatomie westward to Wichita, Kans. Brown Lite Co. R. E. Carriker, spreadman at Osawatomie, Kans.

Phillips Pipe Line Co.—40 miles, 10-in., through Monteau, Cole, Osage, and Gasconade counties, Missouri. Trojan Const. Co. E. L. Maggard, spreadman at Linn, Mo.

Phillips Pipe Line Co.—48 miles, 12-in., under way, looping from Wichita, Kans., to Buffalo, Okla. G. G. Griffis Const. Co. Joe Bishop, spreadman, at Medicine Lodge, Kans. 12-51 completion date.

Phillips Pipe Line Co.—74 miles, 8-in., under way, looping from Decatur, Ill., to East Chicago, Ind. Somerville Const. Co., contractor. 12-51 completion date.

Phillips Pipe Line Co.—69 miles, 12-in., authorized, looping from Paola to Wichita, Kans.

Phillips Pipe Line Co.—137 miles, 10-in., authorized, looping from Paola, Kans., to East St. Louis, Ill. Completion date 11-51.

Progress Pacific Pipe Line Co.—900 miles, 10-in., proposed, California to West Texas.

Salt Lake Pipe Line Co.—Proposed, Pasco, Wash., to Puget Sound.

Shell Oil Co.—565 miles, 8-14-in., planned. Wood River via East Chicago to Detroit; 35 miles, 14-in. Completion date summer of 1952.

Sinclair Pipe Line Co.—8-in., proposed, Sinclair, Wyo., to Salt Lake City, Utah; 10-in., Houston to Baton Rouge; 16-in., Kalamazoo to Detroit; 20-in. Marcus Hook to aByonne, N. J.; East Chicago to South Bend, Ind.

Socony-Vacuum Oil Co., Inc.—175 miles, 6-8-in., under way, Augusta, Kans., to Kansas City, Mo. Ray L. Smith & Son, Inc. (Spreadmen are located as follows: Dewey Whitworth at Topeka, Kans.; Carl Samuel Colvin at Burlingame, Kans.; George Kelpar at Topeka, Kans.; Clark Liggett, Tonganoxie, Kans.) Completion date 1-1-52.

Standard Oil Co. (Ind.).—122 miles, 8-in., under way, Neodesha, Kans., to Belton, Mo. Bills & Troth Construction Co., Carl Bills, superintendent, at Armory Building, Neodesha. Completion date 1952.

Standard Oil Co. (Ohio).—17 miles, 6-in., authorized, Toledo to West Toledo, Ohio.

United States Pipe Line Co.—1,000 miles, proposed, Gulf Coast via Memphis, Nashville, Tenn., Lexington, and Paducah, Ky., to Cincinnati, Ohio.

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Natural-Gas Pipe Lines

Allied Gas Co.—24 miles, 6⅝-in., proposed, McLean to Champaign County, Illinois.

Amere Gas Utilities Co.—16 miles, 8⅝-in., proposed, loops from Mercer County to Princeton, W. Va.

Amere Gas Utilities Co.—15 miles, 8⅝-in., proposed, near Dameron to Flat Top, W. Va.

Associated Natural Gas Co.—88 miles, authorized, Missouri.

Carolina Natural Gas Corp.—185 miles, 2-12-in., proposed, lateral lines off Transcontinental in North and South Carolina.

Cities Service Gas Co.—179 miles, 4-30-in., gathering system in vicinity of Ulysses, Kans. Vaughn & Taylor Const. Co., Inc. D. D. Vaughn, spreadman, Ulysses.

Coast Counties Gas & Electric Co.—40 miles, 3, 4, and 8-in., planned. Coast and Valley region, California.

Colorado Interstate Gas Co.—250 miles, 20-in., under way, Kit Carson, Colo., to Amarillo, Tex. R. H. Fulton & Co., contractor. Jerry Nash, spreadman at Lamar, Colo.

Commonwealth Natural Gas Corp.—537 miles, 20-in., proposed, West Bend, Ky., to Norfolk, Va.

Cumberland and Allegheny Gas Co.—46 miles, 10-in., authorized, Mountain Lake Park, Md., to Preston County, W. Va.

Dow Chemical Co.—70 miles, various sizes, Midland, Saginaw, and Bay City, Mich.; Mahoney Contracting Co., contractor, Ralph Bucher, spreadman at Midland.

East Tennessee Natural Gas Co—172 miles, 22-in., authorized, Greenbrier to Oak Ridge, Tenn.

East Tennessee Natural Gas Co.—100 miles, 16-in., proposed, Knoxville to Kingsport, Tenn.

El Paso Natural Gas Co.—122.9 miles, 30-in., proposed, looping along main line in Texas, New Mexico, Arizona.

Equitable Gas Co.—17 miles, 16-in., under way, near Pittsburgh. H. L. Gentry Const. Co., contractor. Lavern Curtis, spreadman at Sewickley, Pa.

Georgia Gas Co.—32 miles, 4½-in., proposed, Bogart to Gainesville, Ga.

Glacier Gas Co.—285 miles, 20-in., proposed, Kalispell, Mont., to Spokane, Wash.

Glacier Gas Co.—120 miles, 16-in., proposed, Spokane to Hanford, Wash.

Glacier Gas Co.—91 miles, 8⅝-in., proposed, Spokane to Lewiston, Idaho.

Glacier Gas Co.—130 miles, 12¾-in., proposed, Spokane to International boundary at Trail, British Columbia.

Grand Valley Pipe Line Co.—105 miles, 8-10-in., planned, Piceance Creek field to Rifle on to Grand Junction, Colo.

Gulf Michigan Transmission Corp.—680 miles, 30-in., proposed, Perryville, La., across Arkansas, Missouri, and Illinois to terminus near St. John, Ind.

Home Gas Co.—17 miles, 12-in., proposed, loops from Hancock to Sanford, N. Y.

Houston Pipe Line Co.—24 miles, 18-in., under way, Houston to Bammel gas field, Harris County, Texas.

Iowa-Illinois Gas & Electric Co.—41 miles, 10-in., authorized, Washington County to Cedar Rapids, Iowa.

Kansas-Nebraska Natural Gas Co.—40 miles, 6-in., under way, Albion to Norfolk, Neb. Jayhawk Const. Co., Inc., contractor; F. A. Faler, spreadman at Albion.

Kansas-Nebraska Natural Gas Co.—30 miles, 6-in., under way, Albion to Neligh, Neb. Jayhawk Const. Co., Inc., F. A. Faler, spreadman at Albion.

Kansas-Nebraska Natural Gas Co., Inc.—60 miles, 8-10-12-in., under way, Grand Island to Albion, Neb.

Kansas-Nebraska Natural Gas Co.—65 miles, 2-8-in., authorized, Big Springs field to Ogallala, Neb., and to Ovid, Colo.

Kansas-Nebraska Natural Gas Co., Inc.—39 miles, 4 and 6-in., planned, Neligh to O'Neill, Neb., 54 miles, 4 and 6-in. planned, Neligh to Hartington, Neb. (extension). Completion date 1952.

Kansas Power & Light Co.—27 miles, 20-in., authorized, Pratt, Kans., to Calista compressor station.

Lake Shore Pipe Line Co.—45 miles, 10¾-in., authorized, northwesterly from T.G.T. system near Meadville, Pa., to Ashtabula, Ohio.

Michigan Gas Storage Co.—93 miles, 16-22-24-in., under way, Laingsburg to near Pontiac and Mount Clemens, Mich. (Includes 17 miles of lateral lines.) Mahoney Contractor. Completion date 6-52.

Michigan Gas Storage Co.—30 miles, 26-in., authorized, looping between Laingsburg and Mount Pleasant Junction, Mich.

Michigan Gas Utilities Co.—77 miles, under way, Sturgis, Hillsdale, and Coldwater, Mich. (22.7 miles, Marshall south to Coldwater; 20 miles, Coldwater easterly to Hillsdale; 22.5 miles, Hillsdale to Sturgis; 11 miles, Hillsdale to Jonesville.) Somerville Const., contractor. Jim Godwin at Coldwater.

MidSouth Gas Co.—240 miles, proposed, Greene, Poinsett, Crittenden, St. Francis, Lee, Phillips, Monroe, Woodruff, and Cross counties, Arkansas.

Mississippi River Fuel Corp.—98 miles, 16- and 18-in., authorized, feeder line from Lincoln Parish, Louisiana, to Waskom field, Harrison County, Texas.

Mississippi River Fuel Corp.—40 miles, 18-in., authorized, Dubach to Perryville, La.

Montana Power Co.—52 miles, 16-in., authorized, Canada-Montana border to Cut Bank, Mont.

National Utilities Co. of Michigan.—76.7 miles, 20-in., proposed, South Central Michigan. (22 miles from near Marshall south to Coldwater; 20 miles east to Hillsdale; 22 miles southwest to Sturgis; 5 miles from Hillsdale to Jonesville and 6 miles west to Union City.)

New River Gas Co.—50 miles, planned. Summers or Monroe counties, West Virginia to Narrows and Dublin, W. Va.

New York State Natural Gas Corp.—66 miles, 20-in., proposed, looping on Westmoreland, Armstrong, and Tioga counties, Pennsylvania. (Includes 17 miles, 16-in. in Potter County, Pennsylvania, and 21 miles 14 in., replacement in Line No. 507, New York.)

Niagara Mohawk Power Corp.—40 miles, 10-12-16-in., under way, lateral lines at Utica, N. Y.; 55 miles, 10-in., Fulton to Watertown, N. Y.; Williams-Austin Co., contractor, Howard Bauer, supt.

Northeastern Gas Transmission Co.—511 miles, 20-24-in., authorized, New Hampshire, Massachusetts, and Connecticut.

Northeastern Gas Co.—411 miles, proposed, New England towns.

Northern Natural Gas Co.—580 miles, proposed, Kansas, Texas, Oklahoma, and Nebraska loops.

Northern Natural Gas Co.—370 miles, 4-26-in., authorized, gathering lines in Hugoton field.

Northern Natural Gas Co.—217 miles, 26-in., under way, Palmyra, Neb., to Skellyville, Tex. G. G. Griffis Const. Co., contractor; field office, Beatrice, Neb.; G. L. Mims, superintendent; E. G. Grisham, spreadman.

Northern Natural Gas Co.—210 miles, 26-in., proposed, five loops in Texas-Oklahoma area, two in Kansas, and two in Nebraska.

Northern Natural Gas Co.—181 miles, 4-12-in., contracted, gathering system in Hugoton area. Reese Bros. Const., contractor. Completion date in spring.

Northern Natural Gas Co.—108 miles, 26-in., under way, Beatrice, Neb., to Mullenville, Kans. G. G. Griffis Const. Co. E. G. Grisham, spreadman at Great Bend, Kans. Completion date 12-1-51.

Northern Indiana Fuel & Light Co.—33 in., authorized, Perryville Station, La., to Boeuf River.

Northwest Natural Gas Co.—750 miles, planned, Washington, Oregon, and Idaho.

Ohio Fuel Gas Co.—25 miles, 20-in., under way, Xenia, Ohio. Sheehan Pipe Line Const. Co. Earl Williams, spreadman at Xenia.

Ohio Fuel Gas Co.—22 miles, 16-in., authorized, Dayton, Troy, Piqua, and Sidney, Ohio.

Ohio Fuel Gas Co.—23 miles, 16-20-in., authorized, Wellington to Elyria, Ohio; 16 miles, 20-in. authorized, Benton Station to Crawford Station, completion date 11-15-51. 18 miles, 20-in., Crawford Station to near Columbus, completion date 12-31-51. 16 miles, 16-in., authorized, Berlin Heights to Sandusky, Ohio, completion date 12-31-51.

Ohio Fuel Gas Co.—74 miles, 3 to 20-in.,

authorized, Hocking, Knox, and Ashland counties, Ohio.

Ohio Fuel Gas Co.—47 miles, 20-in., authorized, Benton Township, Hocking County, to Columbus, Ohio.

Ohio Fuel Gas Co.—61 miles, authorized northern and southwestern Ohio.

Oklahoma Natural Gas Co.—14 miles, $8^{3}/_{8}$-in., under way, Shamrock to Cushing, Okla.; 21 miles, 24-in., under way, Depew to Kellyville, Okla. Completion date 1-15-52. 9 miles, $12^{3}/_{4}$-in., Stroud to Depew, Okla. 26 miles, 12-in., under way, Ringwood to Enid, Okla. Completion date 3-15-52.

Pacific Gas & Electric Co.—44 miles, 8-in., under way, Salinas to King City, Calif.

Pacific Gas & Electric Co.—141 miles, 34-in., proposed, parallel sections along Topock-Milpitas line.

Pacific Gas & Electric Co.—10 miles, 10-12-in., authorized, Monterey to Fort Ord to Castroville; 12 miles, 16-in., Napa Wye to Shellville; 6 miles, 12-in., Cotati to Santa Rosa, Calif.

Pacific Northwest Pipe Line Co.—400 miles, 22-in., gathering lines on Texas Gulf Coast to Pacific Northwest pipe line.

Pacific Northwest Gas Pipe Line Corp.—1,175 miles, planned, Wharton County, Texas, via Oklahoma, Kansas, Fort Collins, Colo., to Portland, Ore., Tacoma and Seattle, Wash.

Panhandle Eastern Pipe Line Co.—70 miles, 24-26-in., under way, looping from Sneed, Tex., to Emporia, Kans.

Panhandle Eastern Pipe Line Co.—174 miles, 30 and 26-in., contracted, Tuscola, Ill., eastward—looping present system; R. A. Conyes, contractor. 44 miles, 26-in., Edgerton, Mich.; Anderson Bros.; 22 miles, 30-in., looping in Tuscola, Ill.; 45 miles, 30-in., looping in Montezuma, Ind.; 63 miles, 30-in., looping in Zionsville, Ind.

Pennsylvania Gas Co.—52 miles, 12-in., between Warren and Erie, Pa. (Section 1—27 miles, under way and contracted by Harford Bros. Section 2—25 miles.

Peoples Natural Gas Co.—25 miles, proposed, Cambria and Blair counties, Pennsylvania.

Phillips Petroleum Co.—118 miles, 3-22-in., under way, Sherman and Hansford counties, Texas, gas-gathering system; Vaughn & Taylor Construction Co., Inc., Dumas, Tex., J. F. Crawford, spreadman at Texhoma, Okla.

Piedmont Natural Gas Co.—28 miles, 6-in., proposed, North Carolina, laterals from Transcontinental gas system.

Prince George's Gas Corp.—20 miles, 22-in., authorized, between Chillum and Rockville, Md.

Public Service Co. of North Carolina.—33 miles, 10-in., authorized, Burlington to Chapel Hill, N. C., completion date 3-1-52; 16 miles, 8-in., authorized, Chapel Hill to Raleigh, N. C., completion date 7-1-52; 29 miles, 4-in., authorized, Statesville to Kanapolis, N. C., completion date 7-1-52; 83 miles, 8-in., authorized, Kings Mountain to Asheville, N. C., completion date 3-1-53.

Rockland Light & Power Co.—22 miles, 8-in., proposed, Orangetown to Tompkins Cove, N. Y.

Southern California Gas Co.—35 miles, planned, Antelope Valley, California.

Southern California Gas Co. and Southern Counties Gas Co. of Calif.—45 miles, 30-in., proposed, looping on line from Arizona border to Los Angeles.

Southern California Gas Co. and Southern Counties Gas Co.—36 miles, 6-8-in., contracted, Palmdale to Mojave, Calif., Alex Robertson Co., contractor, E. C. Neal, spreadman at Lancaster, Calif., completion date 11-1-51.

Southern California Gas Co. and Southern Counties Gas Co. of California.—81 miles, 30-in., proposed, Whitewater to Desert Center, Calif.

Southern Natural Gas Co.—21 miles, 24-miles, 8-in., proposed, Edgerton to Auburn, Ind.

Southern Natural Gas Co.—14 miles, 24-in., authorized, Onward Station, Miss., to Big Sunflower River.

Southern Natural Gas Co.—14 miles, 14-in., authorized, Perryville Station, La., to Wilhite Gate.

Southern Natural Gas Co.—375 miles, 24-in., planned, Gwinville, Miss., to Atlanta, Ga.

Southern Natural Gas Co.—169 miles, proposed loops, Ouachita Parish, Louisiana, to Augusta, Ga.; 20 miles in Ouachita Parish, 33 miles in Ouachita and West Carroll parishes; 7 miles, Sharkey County, Mississippi; and 108 miles, 14-in., Bass Junction to Augusta, Ga.

Southwest Gas Corp., Ltd.—26 miles, proposed, from P.G.&E. line to Victorville, Calif.

Sunray Oil Corp.—133 miles, 3-30-in., under way, system for Snyder gasoline plant. Vaughn & Taylor Construction Co., contractor. D. D. Vaughn, spreadman.

Tennessee Gas Transmission Co.—521 miles, planned, looping along present system; 420 miles, 30-in., Texas, La., Ark., Miss., Tenn., and Ky.; 101 miles, 26-in., in Kentucky and Ohio.

The Texas Co.—27 miles, 8-in., authorized, Ventura to Filmore, Calif.

Texas Eastern Transmission Corp.—791 miles, 30-in., under way, Kosciusko, Miss., to Connellsville, Pa.

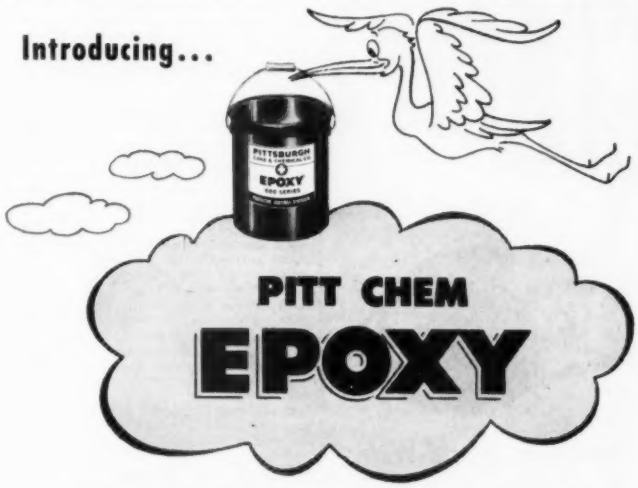
(Section 1 and 2) 163 miles, 30-in., under way, Kosciusko, Miss., to Florence, Ala. Williams Bros.-Davis Co.

(Section 3) 76 miles, 30-in., Florence, Ala., to Columbia, Tenn. Eastern Pipe Line Contractors.

(Section 4) 73 miles, 30-in., under way, Columbia, Tenn., to Cumberland River. H. B. Zachry Co. A. Vaughn superintendent at Lebanon, Tenn. Completion date 12-10-51.

(Section 5) 79 miles, 30-in., under way, Cumberland River to Columbia, Ky. Oman Const. Co. William Smith, superintendent and Floyd Hudnell, spreadman at Columbia, Ky.

(Section 6) 82 miles, 30-in., under way.



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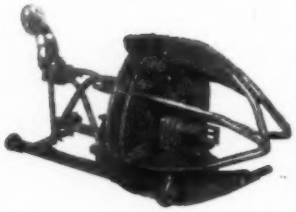
CLAMPS



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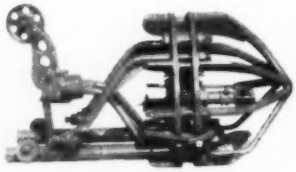

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(Section 8) 77 miles, 30-in., under way. Portsmouth to Amesville, Ohio. Anderson Bros. Corp.

(Section 9) 74 miles, 30-in., under way. Amesville to Ohio-West Virginia river crossing. Anderson Bros. Corp.

(Section 10) 66 miles, 30-in., under way. Ohio River to Connellsville, Pa. Anderson Bros. Corp.

Texas Eastern Transmission Corp.—50 miles, 30-in., under way, Ohio River to Vanceburg, Ky. Trojan Construction Co., Inc., contractor. Charles Tillotson, spreadman at Morehead, Ky.

Texas Gas Transmission Corp.—35 miles, 12-in., authorized. Slaughters, Ky., to Evansville, Ind.

Texas Gas Transmission Corp.—189 miles, 26-in., authorized, Acadia Parish to connection with existing facilities in Morehouse Parish.

Texas Gas Transmission Corp.—195 miles, 26-in., proposed, Gulf Coast region to southwestern Louisiana.

Texas Gas Transmission Corp.—425 miles, 26-in., authorized, looping from Bastrop, La., to Hardinsburg, Ky.

Texas Gas Transmission Corp.—181 miles, 26-in., under way, Bastrop to Eunice, La., Houston Contracting Co. (North spread near Beekman, 65 miles south to Grayson, La., W. H. Hayes, supt.; center spread, north side of Red River at Pineville, 60 miles north to Grayson, E. C. Norris, supt.; south spread, south side of Red River, 56 miles south to Tepetate field near Eunice. F. A. Silar, supt.)

Texas Gas Transmission Corp.—580 miles, 26-in., proposed, Louisiana and Kentucky.

Texas-Ohio Gas Co.—1,350 miles, 30-in., authorized, Hidalgo County, Texas, through Arkansas, Mississippi, Tennessee, and Kentucky on to Spencer, W. Va. Completion date 6-30-53.

Union Gas & Electric Co.—33 miles, 8-in., Farmer City to Bloomington, Ill. Contracting & Material Co. A. T. Perry, spreadman at LeRoy, Ill. Completion date 12-15-51.

Union Oil Co. of California.—40 miles, 8-10-in., planned, San Joaquin Valley and Los Angeles Basin.

United Fuel Gas Co.—32 miles, 20-in., under way, Lanham to Broad Run, W. Va. H. L. Gentry Construction Co., contractor. Frank Morris, spreadman at Charleston, W. Va.

United Gas Pipe Line Corp.—315 miles, 24-30-in., contracted, Agua Dulce to near Goodrich, Tex. Oklahoma Contracting Co., contractor. Panama Shiflett, spreadman, El Campo, Tex.; Ray Law, spreadman, Victoria, Tex.

United Gas Pipe Line Co.—93 miles, 20-24-26-in., under way, Houston to Du Pont's Sabine River Works, Orange, Tex. River Const. Co.

United Gas Pipe Line Co.—50 miles, 16-in., authorized, Baldwin County, Alabama southeasterly to Escambia County, Florida.

United Gas Pipe Line Co.—100 miles, 20-24-26-in., contracted, near Houma to Franklin, La.; Associated Pipe Line Contractors, Inc.

United Gas Pipe Line Corp.—510 miles, 24-26-30-in., contracted, Agua Dulce, Tex., to Monroe, La.; 233 miles, 20-24-26-30-in. from Pure Oil Co.'s offshore platform, Block 32 Eugene Island area to Jackson, Miss., comp. sta.; 60 miles, 12-16-20-in., from Lafayette comp. sta. and Weeks Island field to Franklin, La., to connect with above mentioned 30-in.; 59 miles, 30-in., Jackson comp. sta., Miss. to Texas Eastern Trans Corp.; 124 miles, Sterlington comp. sta. near Monroe, La., to Jackson comp. sta., Miss.; 23 miles, 8-12-16-in., South Louisiana facilities; all contracted by Gulf Southern Contractors, a joint venture including Texas Louisiana Contractors; Oklahoma Contracting Co.; J. Ray McDermott and Morrison Knudson. Inspection by Brown & Root, Inc.

United Gas Pipe Line Co.—65 miles, 30-in., under way, Gonzales, La., to Kosciusko, Miss. River Const. Corp. Red Tatum, spreadman at Hammond, La. Completion date 11-51.

United Gas Pipe Line Co.—43 miles, 24-in., under way, Baxterville, La., to McComb, Miss. River Const. Corp. Jim Reed, spreadman at Columbia, Miss. Completion date 11-1-51.

United Gas Pipe Line Co.—87 miles, 20-in., under way, State Line to Jackson, Miss. River Const. Corp. Merle Tatum, spreadman at McComb, Miss. Completion date 12-15-51.

U.S.E.D.—18 miles, 8⅝-in., contracted, Norwalk to Long Beach, Calif. J. E. Young Pipeline Contractor, Inc.

Utah Natural Gas Co.—360 miles, 22-in., proposed, San Juan Basin area to Salt Lake, Utah.

Virginia Natural Gas Co.—153 miles, Buckingham to Richmond and Portsmouth, Va.

Western Kentucky Gas Co.—2 to 4-in., under way, additions to present system; Modern Welding Co., Inc., contractor.

Western Pipe Lines.—1,200 miles, 22-in., planned, southern Alberta to Duluth, Minn.

West Texas Gas Co.—27 miles, 10-in., authorized, Lubbock to Abernathy, Tex.

West Texas Gas Co.—32 miles, proposed, Potter and Randal counties, Texas.

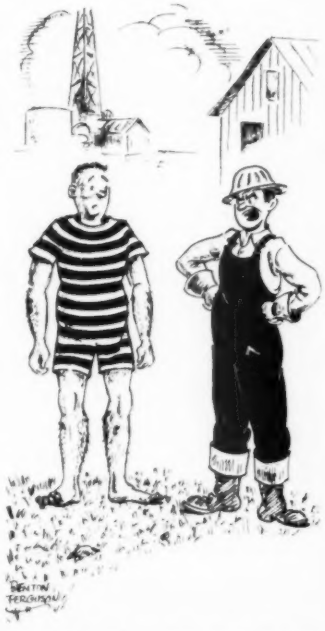
Foreign Crude-Oil Pipe Lines—Planned and Under Way

Alberta-Vancouver Oil Pipe Line Co.—(Brokaw, Dixon, McKee).—972 miles, 16-in., proposed, Edmonton via Pincher Creek, Alta., Idaho and Washington states to Vancouver, B. C.

Cia. de Petroleo Ganso Azul, Ltd.—48 miles, 4-in., planned, Ganso Azul field to Pucalpa on upper Ucayali River, Peru.

Condor S.P.A.—82 miles, 12-in., under way, Genoa to Rho, near Milan, Italy.

Direccion General de Yacimientos Petroli-



"—Sure I said we were going to waterflood, but—!"

feros Fiscales.—409 miles, under way, Plaza Huincul to Bahia Blanca, Argentina.

Independent Pipe Line Co.—721 miles, 16-18-22-in., proposed, Edmonton to Vancouver. Spreads as follows: 185 miles of 22-in.; 391 miles, 20-in.; 95 miles, 16-in.; and 30 miles, 18-in.

Iraq Government.—135 miles, 12-in., proposed, from Iraq Petroleum Co. at Baiji to Baghdad, Iraq. Construction 1952. M. W. Kellogg, contractor.

Iraq Petroleum Co., Ltd.—556 miles, 30-32-in., under way, Kirkuk, Iraq, to Banias, Syria, 1952; Bechtel-Kirkuk, contractor.

Iraq Petroleum Co., Ltd.—72 miles, 12¾-in., Zubair to Fao. Arabian Bechtel Co., contractor. Completion date 12-51.

Middle East Pipelines, Ltd.—800 miles, 34-35-in., planned, Iran to a Levantine port.

Petroleos Mexicanos.—145 miles, 12-in., considered, 18 de Marzo field via Reynosa to Monterrey, Mexico.

Petroleos Mexicanos.—100 miles, planned, Isthmus of Tehuantepec, Jose Colomo to El Plan field, Minatitlan.

Shell Caribbean Petroleum Co.—160 miles, 30-in., under way; Palmajero to terminals on the Paraguana Peninsula (Cardon and Las Piedras, Venezuela), 4-52. Land sections contracted by Williams Brothers, de Venezuela, S.A., Charles P. Williams, manager, Marvin E. Jones, superintendent. Water crossings contracted by Mahoney Contracting Co.

Texas Petroleum Co.—60 miles, 4-6-in., under way, Pto. Nino to La Dorada.

Trans-Mountain Oil Pipe Line Co.—715 miles, proposed, Edmonton, Alta., to Vancouver, B. C. Canadian Bechtel, Ltd., engineers.

Foreign Products Pipe Lines—Planned and Under Way

Colombia Ministry of Petroleum.—90 miles 6-in., planned, Puerto Berrio to La Dorada, Colombia.

Colombia Ministry of Petroleum.—113 miles, 6-in., contracted, Puerto Berrio to Acededo near Medellin, Colombia. Carolina Construction Co.

Colombian Ministry of Petroleum.—75 miles, 4-in., planned, Buena Ventura to Cali, Colombia.

Empresa de Ferrocarriles Ecuatorianos.—50 miles, 4-in., contracted, Guayaquil to Palmira, Ecuador. J. A. Jones, contractor; C.R.C. Engineering Co., engineers.

Estrada de Ferro Santos a Jundiai.—32 miles, 18-in., under way, Santos to Sao Paulo, Brazil (fuel oil line); Techint, contractor. Completion date 12-51.

Governments of Southern Rhodesia and Portuguese East Africa.—200 miles, considered, Beria, Portuguese Mozambique to Umtali, Southern Rhodesia.

Imperial Oil Co., Ltd.—230 miles, 10-12-in., under way, Sarnia via London, Hamilton to Toronto, Ont., Canada. Comstock Midwestern, Ltd., contractor. Completion date July 1952.

Petrocongo (Sub. Cie. Financiere Belge des Petroles, S.A.).—225 miles, considered, Ango-Ango to Leopoldville, Belgian Congo.

Petroleos Mexicanos.—155 miles, 10-in., under way, Minatitlan to Salina Cruz, Mexico.

Societe des Transports Petroliers par Pipe Line.—140 miles, 10-in., under way, Le Havre to Paris, France. Entrepose, contractor. Completion date 1952.

State of Cundinamarca, Colombia.—120 miles, 6-in., Puerto Salgar to Bogota, Colombia; Williams Brothers Co.; David Louthen, manager, Bogota.

Trans-Northern Pipe Line Co.—400 miles, proposed, Hamilton, Ont., to Toronto, Ont., to Montreal, Que., Canada.

Foreign Natural-Gas Pipe Lines—Planned and Under Way

Azienda Generale Italiana Petroli.—110 miles, 12-14-16-in., planned, Cortemaggiore to Genoa.

Azienda Generale Italiana Petroli.—145 miles, 14-16-in., under way, Cortemaggiore to Torino. Completion date 1951.

Canadian Delhi Oil Co. (Subsidiary Delhi Oil Co.).—2,132 miles, proposed, Alberta, Toronto, Montreal.

Canadian-Montana Pipe Line Co.—68 miles, 4-16-in., under way, Pakowki Lake field to Alberta-Montana border.

Direccion General del Gas del Estado.—315 miles, 8-in., under way, Plaza Huincul to Neuquen, Argentina, to the vicinity of General Conesa, Argentina.

Northwest Natural Gas Co.—950 miles, 24-in., planned, Alberta fields to Vancouver, B. C., Seattle, Wash., and Portland, Ore.

Northwestern Utilities, Ltd.—35 miles, 16-in., authorized, Viking to Shonts, Alberta.

Petroleos Mexicanos.—305 miles, 16-in., considered, Monterrey to Torreon, Mexico.

Petroleos Mexicanos.—260 miles, 20-in., under way, Monterrey to Tampico and Poza Rica, Mexico.

Petroleos Mexicanos, Mexican Gas Co., and Industrial Gas Co.—600 miles, planned, Reynosa, Tamaulipas, to Tampico-Poza Rica, Mexico.

Trans-Canada Pipe Lines, Ltd.—Proposed, Alberta to Toronto to Montreal.

Venezuela Atlantic Transmission Corp.—195 miles, 10-12-16-in., under way, El Placer near Las Mercedes, State of Guarico to Caracas, La Guaria, Maracay, and Valencia. Contracted by Williams Brothers, de Venezuela, S.A., B. E. Barnes, manager.

Westcoast Transmission Co., Ltd.—1,110 miles, 24-in., planned, Dawson Creek, B. C., through Pine Pass and Fraser River Valley to Kamloops, Princeton, and Vancouver to Portland. Ford, Bacon & Davis, engineers.

Westcoast Transmission Co., Ltd.—280 miles, 20-in., planned, Pincher Creek to Montana on to Spokane, Wash. Ford, Bacon & Davis, engineers.

Western Pipe Lines.—1,033 miles, 24-in., proposed, from Southern Alberta, eastward across the Canadian Prairies, serving principal towns and cities along the route to a point near the International Boundary.

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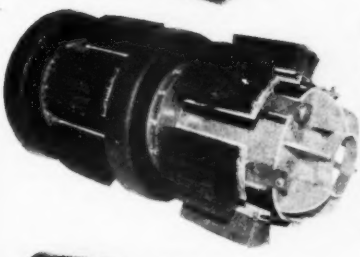

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Financing arrangement set for Texas-Ohio project

HOUSTON. — Texas-Ohio Gas Co. has arranged for interim financing of its proposed 1,350-mile 30-in. natural-gas trunk line with Kidder, Peabody & Co., it was revealed last week by Frank Champion, Texas-Ohio president.

The big line would originate in Hidalgo County, Texas, near the Rio Grande River and extend through Arkansas, Mississippi, Tennessee, and Kentucky, terminating near Spencer, W. Va. The route would follow the Wilcox trend and cross the Mississippi below Memphis *(The Oil and Gas Journal, November 1, 1951, page 92)*.

Estimated to cost around $185,000,000, the project would include construction of 13 compressor stations.

Champion said initial capacity will be 330,000,000 cu. ft. of gas per day, and that Texas-Ohio already has commitments from producers to supply this amount for a 20-year period. Other tentative commitments may call eventually for increasing capacity to 505,000,000 cu. ft.

An application for authority to build the line is now pending review by the Federal Power Commission. It is estimated that the case will be heard within the next 90 days. If the line is approved, construction is expected to begin about the middle of 1952.

Champion said that the company has commitments with area distributors in Ohio, West Virginia, and Pennsylvania for markets to take care of the full planned capacity. Another Texas-Ohio official announced that the company already had steel commitments sufficient to build the line, and that one-half the steel would come from foreign sources in the form of plate.

H. K. Ferguson Co., Inc., of Cleveland, a subsidiary of Morrison-Knudsen Co., will handle engineering work for the proposed project.

Champion also announced the election of Burton E. Hull, Dallas, as a director of Texas-Ohio. Hull recently retired as president of Trans-Arabian Pipe Line Co.

Ashland Joins Six Other Firms in Rancho Project

HOUSTON.—Ashland Pipe Line Corp. will participate in financing and use of Rancho Pipe Line System's projected 463-mile, 24-in. crude trunk from McCamey, Tex., to Houston.

Ashland joins Shell Pipe Line Corp., Sinclair Pipe Line Co., Pan American Pipe Line Co., Phillips Pipe Line Co., Nantucket Pipe Line Co., and Tidewater Pipe Line Co. in the venture. Shell was chosen to design and build the big line.

An initial allocation of 42,467 tons of steel for the line during the first quarter of 1952 was made recently by the Petroleum Administration for Defense. Total steel requirements are 124,979 tons. The Rancho line is scheduled for completion by next fall. It will cost an estimated $41,593,000. Pipe-laying operations are slated to begin around the middle of February, with pump-station construction starting about the first of May.

In revealing the Ashland move, H. H. Anderson, vice president of Shell Pipe Line, said that Shell has completed its gathering system in Gohlke field and has laid 24 miles of its 64-mile, 8-in. line from Gohlke field, 120 miles southwest of Houston to La Grange, Tex. It will tie in at La Grange with Shell's 446-mile, 10-in. line paralleling most of the route of the Rancho line.

The line from Gohlke received an initial allocation of 4,101 tons of steel for the first quarter.

Gulf-Michigan's 780-Mile Natural-Gas Line Shelved

NEW YORK.—Gulf-Michigan Gas Transmission Co.'s plans to build a 780-mile natural-gas pipe-line from Louisiana to Michigan City, Ind., have been shelved indefinitely.

At a meeting of the New York Society of Security Analysts last week, William G. Marbury, president of Mississippi River Fuel Corp., one of Gulf-Michigan's parent firms, said the $90,000,000 project has been postponed for three reasons.

They were: Scarcity of steel pipe; high cost of equity capital needed to finance construction; and inability to obtain firm allocations to guarantee completion. As originally planned, the line would have been placed in operation by late 1952.

Marbury said Mississippi River Fuel's producing subsidiary, Natural Gas & Oil Corp., has completed 11 oil wells and 5 gas wells with no dry holes in Barksdale field of Louisiana, and is actively engaged in drilling operations in Texas and other Louisiana areas.

Natural has about 6,300 acres of checkerboard leases in the Montana and Dakota areas of the Williston basin. The company also is experimenting with an underground-storage project in an old oil field about 15 miles from St. Louis. About 1 billion cubic feet of gas has been stored in the field so far at a depth of about

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1,900 ft. Marbury said several operating problems have to be ironed out before the project can be considered feasible.

Texas Gas Revises Plans For New Line Construction

WASHINGTON.—Texas Gas Transmission Co. made a second attempt last week to get its expansion program approved by the Federal Power Commission. *(The Oil and Gas Journal, November 15, page 193.)*

New natural-gas pipe-line facilities proposed in the application are substantially the same as those rejected by the commission November 6. They include 407 miles of 26-in. loop line on sections of its existing system between Bastrop, La., and Hardinsburg, Ky., and 26,860 hp. (previously 17,260) in additional compressor capacity.

The only material change is the elimination of that part of the application seeking authority to sell up to 90,000,000 cu. ft. of gas daily to a steam-electric plant of the Tennessee Valley Authority at New Johnsonville, Tenn. Texas Gas now proposes to substitute interruptible sales of up to 45,000,000 cu. ft. of gas per day to Ohio Fuel Gas Co., Columbus.

Estimated over-all cost of proposed facilities is $33,752,705. They would supply additional gas to the company's present market areas in Tennessee, Louisiana, Kentucky, Indiana, Ohio, Illinois, Arkansas, and Mississippi.

At the November hearing, Texas Gas was authorized to build a 189-mile, 26-in. line from Eunice to Bastrop, La., to remedy a gas-supply deficiency of about 53,000,000 cu. ft. per day for the company's system.

Also o.k.'d in November was the company's proposal to sell up to 6,000,000 cu. ft. of gas per day on an interruptible basis to Mathieson Hydrocarbon Chemical Corp. for its new plant at Brandenburg, Ky.

Symonds to Address P.L.C.A.

HOUSTON. — Gardiner Symonds, president of Tennessee Gas Transmission Co., will be the principal speaker at the Fourth annual convention of the Pipe Line Contractors Association at the Shamrock Hotel here January 8-9.

It is expected that all attendance records will be broken, with more than 500 persons estimated to be present.

In line with a policy adopted by the board of directors of the association, no exhibits of equipment will be made.

Active membership of the association now stands at 43 pipe line-contracting firms. In addition there are 64 associate members which include firms engaged in subcontracting, manufacturing of equipment, and equipment supplying.

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IT'S NEW — CHECK IT

TRADE LITERATURE

1 JET PUMPS. Bulletin 512 is a 20-page multicolored book complete with data tables, illustrations, schematic drawings, and performance curves which describe the advantages and applications of jet pumps, with particular emphasis on ejectors, eductors, exhausters, and syphons. *Penberthy Injector Co.*

2 NEW EXCAVATOR SALES CATALOG describes the latest advancements made on the Koehring Model 304 excavator and its attachments. The attractive two-color booklet contains 117 illustrations and drawings which depict the story of design, construction, work capacity, and wide application of the heavy-duty excavator. *Koehring Co.*

3 SERVICE TOOLS. New 16-page bulletin illustrates and describes tools designed for servicing Caterpillar tractors. Hand tools and hydraulically operated pulling tools are presented, with attachments and accessories built especially for use with the versatile OTC Power-Twin hydraulic puller. *Owatonna Tool Co.*

4 WELDING ACCESSORIES is a 16-page, 8½ by 11 catalog containing a complete line of arc-welding accessories and supplies. *Hobart Brothers Co.*

5 A-MASTS, a four-page brochure, lists 10 important advantages of these masts, and also includes mast and guy-wire-line diagrams. Complete specifications are given. *Parkersburg Rig & Reel Co.*

6 SLING HANDBOOK AND RIGGERS MANUAL. A 48-page handbook illustrates 11 sling types and covers dimensions, weights, and safe working loads. Some 30 illustrations of sling uses accompany the factual data as a help in selection of proper types. The manual illustrates and gives step-by-step instruction on wire-rope splicing. Data on efficiencies of wire-rope attachments and illustrated directions for attaching sockets or ferrules are also included. *Union Wire Rope Corp.*

7 NONIONIC SURFACE-ACTIVE AGENTS FOR BETTER DETERGENTS. This 12-page, multicolor brochure describes three distinctive surface-active agents: B-48, B-79, and B-97, all of which are being used to improve secondary recovery. Typical test, physical and chemical and detergency properties; dermatological data; and applications are included for each agent. *Hercules Powder Co.*

8 NEW GAS-SCRUBBER BULLETIN is complete with a capacity-curve sheet, cross-section diagram, and other technical data including typical installation pictures. *Peabody Engineering Corp.*

9 GLASS-LINED PIPE AND FITTINGS, as well as glass-lined and alloy valves, are described and pictured in an 11-page bulletin. Fitting tables and dimensional charts are included. *Pfaudler Co.*

10 WET-PIT FREEFLO PUMPS. Bulletin W-317-B12 describes Freeflo pumps for sump, sewage, and drainage service. It includes a cross-section drawing, graph of coverage for 60-cycle motor speeds, dimensions in inches, and data on flanges. *Worthington Pump & Machinery Corp.*

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OIL AND GAS EQUIPMENT Digest WITH CHECK IT

11 DRILL PIPE. An eight-page, three-color pocket-sized brochure presents features and size specifications of Spangweld drill pipe, a new drill pipe with welded connections. *Spang-Chalfant Division, National Supply Co.*

12 ANTILEAK BOOKLET. A new 24-page booklet describes the properties and advantages of Carboseal brand antileak for stopping leakage in bell-and-spigot joints of gas mains. According to the booklet an entire gas-distribution system can be treated without uncovering every joint and without the need of continuous rehydration or fogging. *Carbide & Carbon Chemicals Co.*

13 OIL AND GREASE SEALS FOR BEARINGS is a 100-page catalog containing illustrations of all types of Klozures, typical applications and a complete list of sizes and part numbers. In addition it describes in detail mechanical pressure seals for rotary shafts. *The Garlock Packing Co.*

14 CABLE-TOOL MEMO BOOK containing drill (bit) steel temperature chart and field-dressing instructions is available for distribution at oil shows, conventions, and other group meetings of well drillers (oil, gas, or water). *Acme Fishing Tool Co.*

15 MODEL KC 38-S DRILLING MACHINE, designed for hard drilling, such as loose boulder and rock formations, is described and pictured in a four-page multicolored brochure, which also includes diagrams and specifications. *Franks Machine Co.*

16 GENERAL PURPOSE PUMPS. This multicolor brochure gives construction details on grease-lubricated, pedestal-mounted, general-purpose pumps available in capacities to 2,500 g.p.m. at heads to 550 ft., that can be had with stuffing-box or mechanical seal and direct-coupling, or v-belt drive. *Allis-Chalmers Manufacturing Co.*

17 WELDED LEASE TANKS is a multicolor folder devoted to facts about 500 to 1,000 bbl. shop-welded tanks. Subjects covered are freedom from leakage, comparisons between bolted and welded tanks, interior protective coating and painting, portability, maintenance, designs, and advantages. *Sivalls Tanks, Inc.*

18 EZY PIER ANCHOR. In addition to specifications on several models of wire-rope anchors, this folder fully illustrates methods for installing this anchor in many applications. *Van Dyke Industries.*

19 FULLER ROTARY COMPRESSORS AND VACUUM PUMPS. Bulletin C-6 illustrates rotary compressors in many installations throughout the country. Sectional drawings and text explain the principle of operation. *Fuller Co.*

20 INERT GAS GENERATORS for eliminating explosion hazards in purging operations or wherever inflammable gases or liquids are processed, handled, or stored are briefly described in an eight-page bulletin. *Roots-Connersville Blower Corp.*

21 M. S. A. CHEMKLOS. Bulletin CF-28 includes a sample of the material from which these new work clothes are made. The fabric, Dynel, resists acids, caustics, wear, moths, mildew, shrinkage, snagging, and tearing. *Mine Safety Appliance Co.*

22 TRUSCALE REMOTE READING LIQUID LEVEL GAGES, an eight-page, illustrated brochure explains the installation and advantages of gages designed to indicate from 24 in. of level variation at 650 psi. up to 100 in. of level variation at 1,500 psi. *Jerguson Gage & Valve Co.*

23 BALANCED/OPPOSED MOTOR DRIVEN COMPRESSORS. This fully illustrated, 50-page book explains the principle of balance in a compressor, the advantages of opposed construction, and includes illustrations and specifications of three models ranging from an 8-in. stroke developing 150 to 600 b.hp. up to a 17-in. stroke developing from 1,500 to 4,500 b.hp. *Clark Bros Co., Inc.*

24 PIPE-LINE STRAINER DATA MANUAL. Several types of pipeline strainers for all purposes ranging in sizes from ½ to 36 in., some of which embody new concepts of design and function for making continuous production process possible, are described and illustrated in a new booklet. *J. A. Zurn Manufacturing Co.*

25 MURRAY TYPE H TURBINE, an illustrated data sheet, describes features of the equipment including enclosed shaft through governor, making it possible for the turbine to have a double extended shaft. *Murray Iron Works Co.*

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OIL AND GAS EQUIPMENT Digest

IT'S NEW CHECK IT

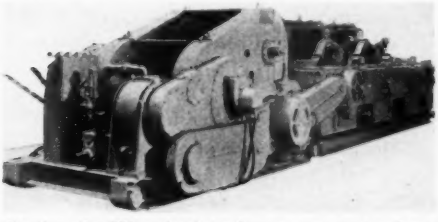
by Dan B. Miller

26 MODEL N pH METER. This new instrument is light in weight, unusually compact, and amply rugged to be used anywhere, in the field, in the plant, or in laboratories without dependence upon outside power circuits. The complete instrument including built-in power supply weighs less than 8 lb. The electrode support is mounted on the side of the case so that it can be easily rotated to permit the instrument to be used in either a horizontal or vertical position.

The electrodes plug in directly to the side of the instrument case, permitting quick interchangeability of electrodes. The electrodes, practically unbreakable, cover virtually the entire pH range from 0 to 14, and can be safely used at temperatures ranging from freezing to boiling. *Beckman Instruments, Inc.*

IT'S NEW CHECK IT

27 NEW HYDRAIR AND MECHANICAL 750 SERIES DRILLING RIGS. Designed for two or three-engine



application, the 750 series introduces a conversion feature. It can be converted from mechanical to torque-converter drive. This conversion is accomplished by equipping the M-750 with high-speed engines and torque converters, changing one sprocket, and modifying the air-control system. This feature enables the operator to use his existing low-speed engines, and at a later date modernize the rig when engine replacement is made. The Hydrair and Mechanical series drilling rigs are recommended for drilling to 8,000 ft. with 4½-in. drill pipe when equipped with two or three engines developing a total of 750 hp. The 750 series features: pressure water-circulated brakes, a cathead-disconnect clutch, oil-bath chain guards over all chains, an integrally mounted hydraulic or dynamatic brake, optional sandline drum, long sandline and main drums which reduce wear on wire lines, finger-tip air controls, and air clutches. *Ideco.*

IT'S NEW CHECK IT

28 NEW LINE OF RESISTANCE THERMOMETERS for accurate indication and control of temperatures ranging from minus 100° F. to plus 300° F. are available in three basic types: The HP-11 resistance-thermometer indicator; the HP-13 two-position controller or protector; and the HP-14 three-position controller. Each type is designed for either flush or surface mounting. All the thermometers use the crossed-coil moving element and a high-strength 3¼-lb. alnico V magnet, designed for hard usage and reliable operation. The entire mechanism is enclosed in a dust-tight, moisture-resistant case-and-cover assembly that permits its use in moist or contaminated atmospheres. *General Electric Co.*

IT'S NEW CHECK IT

The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.

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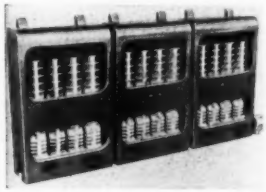
29 TRIPLE-SPIRAL PARAFFIN SCRAPER can be installed in a matter of a few minutes at the well site. It is made of spring steel, blade die formed and heat treated to form a triple spiral, the i.d. of the hole ⅛ in. less than the o.d. of the rod, insuring a spring-tension grip on the rod. The product has been found to resist 2,350 lb. pressure before slipping. Action thoroughly removes paraffin and provides complete coverage of the tubing well. In case of damaged rods, the scraper can be removed from the damaged rods and installed on new or replacement rods. The product is available in sizes to fit ⅝ to 1-in. rods in 2 to 3-in. tubing. *Tripplehorn Co.*

IT'S NEW CHECK IT

30 6,000 WATT EXPLOSION-PROOF HEATER. Especially designed for use in temperatures containing gasoline, petroleum, naphtha, acetone, benzene, solvent vapors, and natural gas, the Electromode has found wide application in pump, valve, and meter houses and personnel warming shelters. The exclusive safety-grid heating element consists of a nickel chromium resistor wire, insulated and sheathed in a seamless metal tubing which is embedded in a one-piece finned-aluminum casting. This completely seals the element, eliminating fire, shock, and burn hazards. The aluminum grid remains at a low operating temperature, but has high thermal conductivity and is 100 per cent efficient. It will not rust or corrode and there are no troublesome liquids to freeze up or run dry. Heaters are made in three models with ratings of 2,000, 4,000, and 6,000, designated as Models CX-2, CX-4, and CX-6. *Electromode Corp.*



IT'S NEW CHECK IT

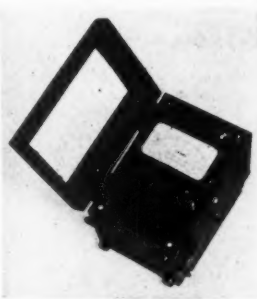
31 NEW TEMPERATURE REGULATORS. Known as type UBA, the regulator is packless, single seated, fully balanced, and hermetically sealed for reliable operation under the most adverse conditions. Handy visual control is provided by a dial adjustment on top of the regulator. The regulator is available in ¼, ⅜, and ½-in. sizes for steam pressures to 150 psig. and control of temperature between 30° F. and 325° F. Control can be applied over a 60° F. range. Eight feet of capillary tubing and a 1-in. connection on the bulb are standard equipment. *Farris Stacon Corp.*

IT'S NEW CHECK IT

32 INDUSTRIAL PAINT ROLLER. a new heavy-duty paint roller designed for use in heavy industry for large area coverage on walls, ceilings, floors. and structural-steel work. By making possible the painting of surfaces from a standing position on the floor, this roller cuts hazards inherent in use of ladders or scaffolds. The large-diameter roller holds a substantial amount of paint which can be rolled on the surface rapidly. Features of the roller include the following: Genuine lambswool roller; works with all paints; "Flip Lock" makes rollers instantly interchangeable; rollers run on oversize brass bearings; covering material permanently attached to roller; rustproof aluminum frame. It comes in three sizes: 9, 14, and 18-in. Four-foot handle is standard. *American Products Co.*

IT'S NEW CHECK IT

33 MODEL 243-A VIBROGROUND is a new, direct-reading meter for measurement of soil resistivities from 0 to 30,000 ohms per cubic centimeter. Weight with batteries is only 9 lb. Lever-action switch is placed for thumb operation, either with instrument carried by sling strap or harness. Meter glass is shatterproof; and meter scale is baked enamel to prevent curling or buckling under extremes of heat and humidity. Polarized microphone-type probe connector eliminates binding posts. Power is provided by eight standard No. 2 flashlight batteries. Probe has large comfortable handle and replaceable, screw-in tip. One extra tip is carried in lid of meter. *Associated Research, Inc.*



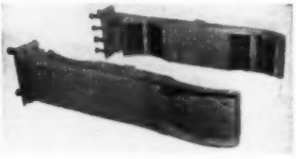
IT'S NEW CHECK IT

34 TREASURY FORMS 1099 are of the snap-out variety, bound four on a sheet with preinserted, one-time carbon. These Treasury information forms were designed by experts to meet the demand created by recent changes in Treasury Department Regulation 111 (26 CFR Part 29), Paragraph 4, Section 29.148.1 brought about by Treasurer's decisions Nos. 5856 and 5859. The newly amended regulation requires that all dividend payments made by corporations, investment trusts, banks and others acting as fiscal agents during 1951 be reported on Form 1099. Forms 1099 carry the reporting corporation's name and address imprinted on all parts of the sets. Forms are bound and perforated on the left margin,

printed four on a sheet in three or four-part sets, with preinserted carbons. All copies needed are obtained with just one writing. *Ross-Martin Co.*

IT'S NEW CHECK IT

35 NEW DRUM-HANDLING ARMS FOR LIFT TRUCKS. The attachments are the model "20" two-drum handling arms and the Model "40" four-drum handling arms with replaceable pads. The arms feature a specially-designed steel-backed, replaceable rubber pad. The standard Hyster model "20" equipped with the new two-drum arm has an average rated load of 1,990 lb. With the new four-drum arm the model "40" has an average rated load of 2,800 lb. The new attachments come as a complete assembly fully interchangeable with the old arm assemblies. No special tools are necessary to remove and replace the pads themselves or to interchange along the arm to distribute the wear. *Hyster Co.*



IT'S NEW CHECK IT

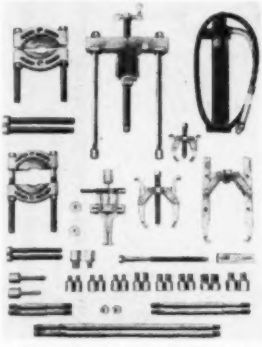
36 WINDSOCK. A boon to bald-headed men or anyone else who wears a safety hat in the winter time, an expendable, light weight, throw-away type head covering to be worn under the safety hat is offered. Windsock is a warm, snug-fitting health protector that can be had in two ear-covering lengths, 9 and 11-in. *Standard Safety Equipment Co.*

IT'S NEW CHECK IT

37 VINYLITE COATING. Steel drums and containers are protected from their contents and contents from the metal, by an inside coating based on Vinylite resins. This coating will flex and conform to a dented contour with no breaks in the protective coating if the container is dropped or otherwise roughly treated. Strongly adherent to the drum wall, the lining retains its elasticity after long aging and will not chip, blister, or peel under severe use. It is odorless, tasteless, and resistant to moisture, oil and grease, most weak acids, salts, dyes, wetting agents, dispersing agents, alcohol, and similar chemicals. Applied with brush or with conventional spray equipment, the coating is normally force dried for about 15 minutes to 250° F. Drum linings are usually made from .002 to .004 in. in thickness. *Gates Engineering Co.*

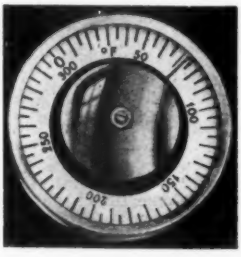
IT'S NEW CHECK IT

38 HYDRAULIC SERVICE SETS FOR CATERPILLAR TRACTORS are designed especially for use with the new OTC Power-Twin hydraulic puller, a 17½-ton hydraulic ram. The set contains the minimum assortment of pullers, adaptors, and attachments which have been tested and found essential to service Caterpillar tractors. The hydraulic Power-Twin takes the hard work out of pulling and installing operations involving gears, bearings, sleeves, pulleys, shafts, sprockets, bearing outer races, and bushings. A 30-ton ram also adaptable for use with standard OTC pullers is also available. *Owatonna Tool Co.*



IT'S NEW CHECK IT

39 SURFACE TEMPERATURE THERMOMETER for the fast and accurate checking of the outside temperature of pipes and for checking the temperatures of journals and other bearings, electric motors, and cylinder blocks, may be quickly and easily affixed to any flat surface by applying a small amount of silicone grease, supplied with the instrument, and sticking the thermometer in place. Also with the thermometer is furnished a small magnetic clamp which will hold it securely in place when applying it on steel dies or other ferrous surfaces. The thermometer has been designed to produce an essentially unilateral thermal instrument which indicates the temperature from the back of the instrument only. A highly reflective evaporated mirror on the dial insures the thermal element against external radiation. The range is 0° to 300° F. calibrated in 2° increments. *Pacific Transducer Co.*



IT'S NEW CHECK IT

40 PRESSURE PILOT. A new compact nonindicating pressure controller for regulating control valves is for use on process systems in the chemical, petroleum, power, and other industries where pressure control is essential. The pilot employs a bourdon tube to measure the pressure and a flapper and nozzle arrangement to produce an air signal directly to the valve. The air signal is based on a change in line pressure. The unit may be mounted directly on the control valve or on a wall or panelboard. Also, the control action may be changed from direct to reverse in a matter of seconds, and the mechanism is protected from damage by an overload spring arrangement. *Minneapolis-Honeywell Regulator Co.*

NATURAL GAS

More Firms Protest Payment Of Texas' Gathering Tax

HOUSTON.—The campaign to contest Texas' new gas-gathering tax is gathering momentum.

Nine companies which paid the tax for September without protest have filed protested payments for October.

Final tabulations by the state comptroller revealed that $531,735.99 was paid under protest for October, while $389,491.45 was not protested. This compares with $415,469.73 and $432,919.36, respectively, for September.

Most of the change was accounted for by three companies. They were Transcontinental Gas Pipe Line Corp., Trunkline Gas Co., and Phillips Petroleum Co., whose October payments totaled $50,445.70, $21,315.97, and $16,102.03, respectively.

October collections from 180 payees were $921,227.41 against the September total of $848,389.09 from 194 taxpayers in September. Several of the small firms failed to file reports in October, thereby causing the number of protests to drop from 78 to 76, while those paying without protest slipped from 116 to 104.

Protesting companies are expected to test the gas-gathering levy in court after the first of the year.

Texas Delegates to Tristate Gas-Problems Study Named

AUSTIN.—Texas Gov. Allan Shivers has named five Texans to work with Oklahoma and Kansas representatives on a study of mutual natural-gas production and marketing problems. The action was taken in response to a resolution of the Texas legislature calling for a tristate study of natural gas, particularly as affecting industrialization of the Southwest.

The Texas delegation includes Ray C. Johnson, Shamrock Oil & Gas Co., Amarillo; Earl Baldridge, The Chicago Corp., Fort Worth; Maston Nixon, Southern Minerals Corp., Corpus Christi; Watson W. Wise, oil and gas producer, Tyler; and Alf W. Roark, attorney, Houston.

Biggest System Conversion Planned by Brooklyn Union

NEW YORK.—Brooklyn Union Gas Co. will convert its gas-service system to straight natural-gas next year in the biggest such operation ever attempted, if the New York State Public Service Commission agrees to the switch.

The project would involve switching service to about 900,000 customers at a cost of approximately $21,000,000. Hugh Cuthrell, Brooklyn Union president, said work is scheduled to begin March 6, 1952, and be completed by October 1.

About 2,000,000 gas appliances in the firm's service area would have to be adjusted by a special force of 3,000 employes.

Cuthrell predicted that Brooklyn Union's volume of gas sales, up almost 50 per cent in the last 10 years, would climb another 40 per cent in the next 3 years as a result of the conversion to natural gas. House-heating customers are expected to double in the same period.

Institute of Gas Technology Observes 10-Year's Growth

CHICAGO.—The Institute of Gas Technology, now observing its tenth anniversary, has grown from a vision to an established educational and research institution.

Since 1941, when sufficient funds were raised for a start and an affiliation was arranged with Illinois Institute of Technolgy, the institute has carried out research projects for the industry totaling more than $1,800,000 in addition to conducting its specialized educational program.

Up to the present $293,000 has been expended on the educational program. Research for the industry has involved expenditures of $1,058,000 on 33 A.G.A. projects, $504,000 on sponsored projects, $20,000 in sponsored tests, and $249,000 on 20 basic-research projects from members dues and contributions. A total of 503 research reports have now been prepared.

Major-research activities have been devoted to production of base-load and peak-load gases, starting with the raw materials: natural gas, natural-gas condensates, petroleum, and coal.

SEC Gets Amended Plan for Reorganizing Arkansas Firm

WASHINGTON.—Cities Service Co. filed an amended plan with the Securities and Exchange Commission last week which would speed the reorganization of Arkansas Natural Gas Corp.

Under the plan, Arkansas-Louisiana Gas Co. would take over Arkansas Natural's transportation, distribution, and other facilities, and Arkansas Natural would change its name to Arkansas Fuel Oil Corp. which would take over petroleum activities of the present Arkansas Fuel Oil Co. and its subsidiaries.

Arkansas Fuel Oil Co. would get all leases, gas wells, equipment, and field-gathering lines in the Carthage acreage. In addition, it would transfer to Arkansas-Louisiana all natural-gasoline plants not on the Carthage acreage.

Third-Quarter Gas Sales Reported at $270,000,000

NEW YORK. — Natural - gas sales during the third quarter totaled 8.666 billion therms to bring in revenues of $270,000,000, according to the American Gas Association.

These figures were 12.1 per cent and 17.5 per cent, respectively, above corresponding totals for third-quarter sales in 1950.

For the year ended September 30, 1951, sales of natural gas totaled 42.799 billion therms for revenues of $1,579,000,000 to register increases of 16.3 and 23.2 per cent, respectively, over the like period in 1950.

FOR BETTER GAS EDUCATION.—This is the Institute of Gas Technology's new $500,000 building at Technology Center, Chicago. The building houses the Institute's research laboratories, classrooms, and reference libraries. It is a two-story, 170 by 74-ft. reinforced-concrete structure with a full basement. The Institute also acquired recently a pilot plant at Crawford Station, Chicago, which was rehabilitated by Peoples Gas Light & Coke Co. at a cost in excess of $100,000. It contains four 20 by 20-ft. bays with 50-ft. headroom and two 12 by 60-ft. areas. Public Service Co. of Northern Illinois contributed $5,000 to increase the plant's power supply to 200 kw.

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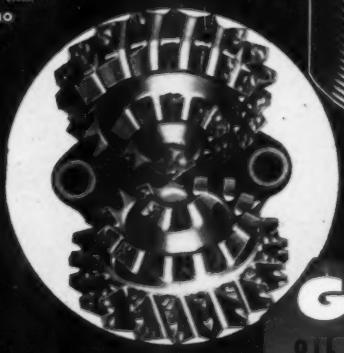
Globe Jet Rock Bits are now available in all popular sizes from 8½" to 15", in types SS2C, S2C, M2C, MH2C, and H2C.



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Drilling Contractors

Shreveport Firm Sells Farmington Facilities

Properties which H. L. Rowely, Inc., Shreveport contracting and operating firm, formerly owned and operated at Farmington, N. M., under the name of Big Chief Western Drilling Co., have been sold to El Paso Natural Gas Co. These properties consisted of the firm's office, warehouse and yards at Farmington; one rotary rig, currently running in La Plata County, Colorado; a cable-tool rig working in the Kutz Canyon field in San Juan County, New Mexico. Acreage totaling 2,300 acres which the Shreveport firm held in San Juan County were "farmed out" to the El Paso company in the same transaction. The latter company agreed to drill 14 wells on this acreage during the coming year.

Drilling Firms Expand

Creekmore Drilling Co., Tulsa; Suntex Drilling Co., Oklahoma City; and E. K. Carey Drilling Co., Denver, are "foreign" drilling companies which have just been granted permits to operate in Texas. The Tulsa company has Texas offices at Fort Stockton; Suntex, at Vernon; and the Carey company at Fort Worth.

Dunbar Drilling Co., Salem, Ill., one of the steadily increasing number of Illinois basin contractors and operators getting into the Denver-Julesburg basin play, is moving a rig to a wildcat location in the East Dalton area, Cheyenne County, Nebraska, where it will drill for Charles D. Edmonson. The new operation is 1 Baker, located in the SE SE SW 30-17n-49w. This contractor also has a contract for a wildcat test to be drilled for LeClerg & Laucomer in the North Mitchell area, in Sioux County, Nebraska. The latter location is in the SE NE NW 22-24n-56w.

Portable Drilling Co., Tulsa, will be Carter Oil Co.'s contractor on a projected wildcat test to be drilled north of Gage, in Ellis County, western Oklahoma. This operation will be 1 Rosendale, with location in the C NW SE 22-23n-24w. Contract is for 9,800 ft.

Peak Drilling Co., Inc., Casper, has a rig working for Trigood Oil Co. on a wildcat location in the West Greybull area, Big Horn County, Wyoming. Location, on a government-owned lease, is in the NW NE SE 27-52n-94w.

Leo Vance, Pawhuska, Okla., contractor, is starting another shallow well, the second for Jon Carson in the revived Whitetail district of northeastern Osage County. The recently completed first test, 1 Osage, NW NE SW 34-27n-10e, reopened the area with Bartlesville sand production at a total depth of 1,850 ft. **L. E. Reames,** Bartlesville, Okla., contractor, is drilling another test for the same operator in another old area further east in the county, in the NWc 22-26n-12e, near the Wash-

Workover rig and crew of Wayne Roberts Drilling Co., Healdton, Okla., operating in the Velma field, Stephens County, southern Oklahoma. Left to right: Hershell Hendrex, M. Y. Turner (driller), M. Amerson, J. E. Sargent, and Lee Thomas.

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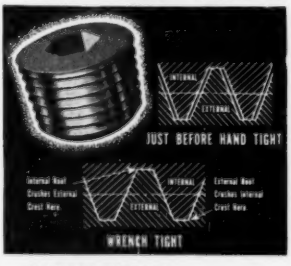

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ington County line, southwest of Bartlesville.

Loffland Brothers Co., Tulsa, has been awarded the contract for the 10,000-ft. wildcat test which Frank Buttram and associates have projected for the Gotebo area in southwestern Oklahoma. Location, on the operators' Smith lease in the SE SE NW 34-8n-16w, is in southern Washita County, just north of the Kiowa County line. It is about 3½ miles north of Gotebo, Kiowa County, and about a mile northwest of a deep wildcat Stanolind Oil & Gas Co. is drilling.

Garland Anthony Drilling Co. is drilling a wildcat test for its associated producing company, Garland Anthony Oil Co., at 1 Daley, C NE NW 21-19s-21e, Columbia County, Arkansas. Hole is projected to the Travis Peak, expected around 6,600 ft.

Wolfe Drilling Co., Tulsa, has moved a rig to the old Garrett area of Kay County, Oklahoma, where it will drill a Wilcox test for Davis & Wharton. Location is for 1 Blaser, in the SE SE SW 30-27n-2e.

Dan R. Rives, Holdenville, Okla., has a contract and is moving in tools for a test to be drilled in Washington County, northwestern Arkansas. Operator is Irving Greenspan of Dallas. The test, 1 Walker, is located 3 miles south of Wheeler, in the SE SW SE 6-16n-31w. Contract is for 3,500 ft.

W. C. Curry, Longview, Tex., will drill for **Vernon Whiteley Drilling Co.,** Tyler, Tex., at the latter's 1 Ober, a Smackover lime exploratory test in 16-23n-8w, north of the Jones townsite, in Morehouse Parish, Louisiana. The objective is expected at 3,200 ft.

J. B. Downs Drilling Co., Magnolia, Ark., is starting a 6,500-ft. test at a wildcat location near Marthaville, in Natchitoches Parish, Louisiana. J. B. Downs, head of the drilling company, and S. W. Nix are operators. Location is on their Dixon lease in 28-9n-10w.

ACTIVE ROTARY RIGS*
(United States and Western Canada)

Area—	Week ended 12-3-51	Change week ended 11-26-51	Change week ended 12-4-50
Gulf Coast	676	+14	+90
W. Tex.-N. M.	1,075	+14	+287
Ark.-N. La.-E. Tex.	190	—4	+34
Oklahoma	350	0	+54
Kansas-S. Nebraska	196	+9	+36
Illinois-Eastern	149	+5	+14
Rocky Mountain	200	+3	+82
Pacific Coast	180	+3	+44
Total United States	3,016	+44	+641
Western Canada	148	—14	+40
Total	3,164	+30	+681

*Courtesy Hughes Tool Co. Trends in drilling activity in the United States and the West Texas-New Mexico and Oklahoma-Kansas areas are shown on pages 160 and 161.

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SAFE—checker plate nosing bars make each step stand out clearly. Abrasive edging also available.

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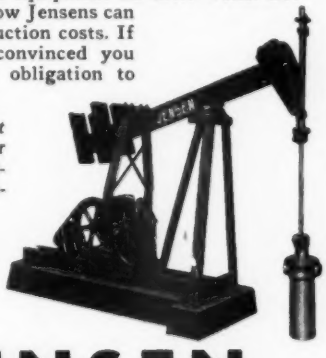

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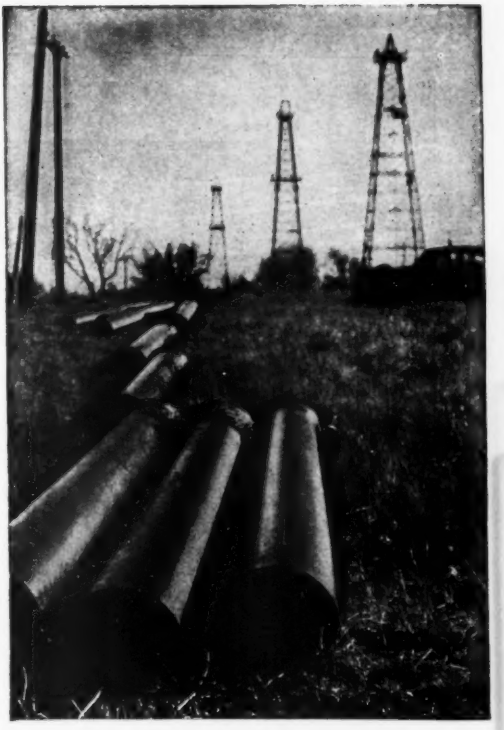

AN OLDTIME RECIPE FOR LONG-LIVED PIPE LINES

A recipe that waterworks and gas distribution engineers have used for over a century is: *specify cast iron pipe.* Refinery engineers have used it, too—with good success—for run-down, water and gasoline lines—for fire protection systems—salt water disposal—condenser and cooling coils.

No other pipe, at reasonable first cost, offers comparable resistance to both interior and exterior corrosion. No other pipe, in its price range, is as economical in the end. Available with bell-and-spigot, plain end and flanged, or with standardized mechanical joints. Cast Iron Pipe Research Association, Thomas F. Wolfe, Engineer, 1015 Peoples Gas Bldg., Chicago 3, Illinois.

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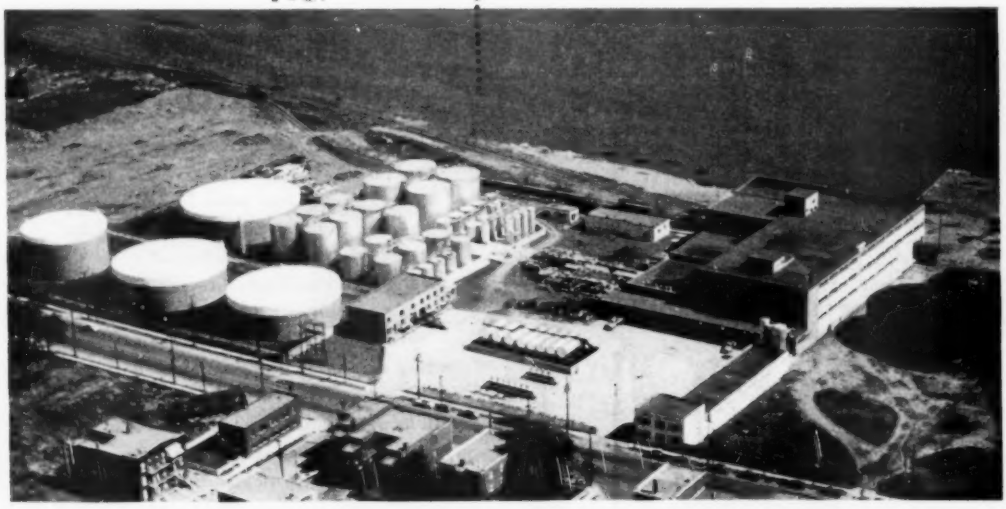
"Model" Grease Plant FOR CANADIAN OIL COMPANIES, LTD.

This lucite, scale model was the "blueprint" used by Fluor engineers to plan and construct the new modern lubricating oil and grease manufacturing plant for Canadian Oil Companies, Ltd., in Montreal. Being able to work out detailed designs in miniature, played a big part in the successful selection and location of all equipment to facilitate the natural flow of work through the plant with a significant saving in man hours. It is an example of the thoroughness with which Fluor tackles a job.

Over 300 varieties of specially engineered greases and lubricants packed in a multitude of sizes, from 3 ounce cans to 55 gallon drums, are manufactured, blended, packaged and stored in this efficient plant. It had to be built in a U-shape to incorporate the original plant which still houses much of the blending machinery. It had to be accessible to all forms of transportation by land or water. It had to provide storage facilities for raw grease stocks before processing and for interior storage of finished products. It had to be equipped with the latest automatic devices for heating, blending, sterilizing, conveying, packaging, handling, etc. and it had to be completed in the shortest time possible.

Fluor's experience with building and remodeling plants which use bulk materials for a variety of products, has long been established, but at Canadian Oil much of the machinery is Fluor designed—especially that used for handling materials. The flexibility of this equipment is almost human in its ability to switch from one type of product to another, from one type of container to another and from one type of carrier to another whether it be truck, box car, tank car, freighter or tanker, without loss of time for change-over.



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REFINING

New Coker

Shamrock to build first continuous-contact unit

SUNRAY, Tex.—Contract for design and construction of the first commercial unit to employ continuous contact coking, has been awarded to Lummus Co. by Shamrock Oil & Gas Corp.

The new plant, capable of processing 1,000 bbl. of reduced crude per day, will be constructed at the company's 10,000-bbl. per day refinery here.

The contract marks the culmination of many years' research on the part of Lummus and others in developing the continuous-contact coking process. It differs from the conventional delayed-coking process, in contacting a reduced crude and recycle stream with a moving bed of free-flowing, preheated coke particles.

As the coke particles are circulated through the reactor, additional coke is deposited in very thin layers. Continuous draw-off of the largest particles constitute the net coke production of the unit. Coke is recirculated to the top of the reactor by vapor lift.

Gas-oil yield.—The process produces a maximum yield of gas oil which is subjected to a minimum of thermal cracking and therefore shows good catalytic feed-stock characteristics. The coke yield is lower than that of conventional delayed cokers, but the product, having been subjected to partial calcination, is high in density and mechanical strength, and low in volatile matter. *(The Oil and Gas Journal, July 14, 1949, page 90; November 3, 1949, page 70; March 29, 1951, page 190).*

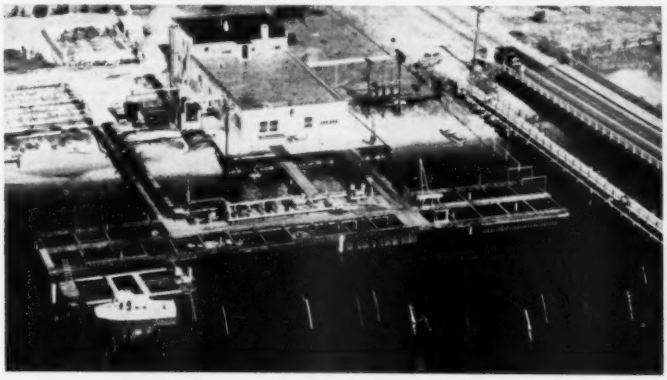
The new Shamrock unit will be operated in conjunction with a new 5,900-bbl. per day Houdriflow catalytic cracking unit. Initial operation is expected by mid-1952.

Design of this first commercial unit is based on 2 years' operation of a 100-bbl. per day semicommercial contact coker. The experimental unit, located in California, has been under continuous testing by Lummus in cooperation with Richfield Oil Corp. and Union Oil Co. of California. Earlier pilot-plant studies were conducted cooperatively by Lummus and Gulf Oil Corp.

Revamping of Sid Richardson Refinery Nearing Completion

TEXAS CITY.—A modernization program at Sid Richardson Refining Co.'s 20,000-bbl. per day refinery is nearing completion, according to F. W. Burford, president.

A major change was made in cooling-water arrangement, which now finds approximately 600,000 gal. per day of water being purchased from Galveston County Water Co., a joint venture of Pan American Refining Corp. and Carbide & Carbon Chemicals Division, which obtains water



FIGHTING CORROSION.—More facilities for the study of salt-water corrosion are being added to this Harbor Island station of the Kure Beach testing project near Wilmington, N. C. New equipment includes a salt-water evaporator and distillation unit and a steam boiler plant with a 4,000 lb. per hour capacity. The new unit will be installed in the present laboratory building and a new two-story building erected to replace this space. The new building will house machine and carpentry shops and the new boiler on the first floor, while the second floor will provide space for a meeting room and a marine museum where test specimens will be placed on display. The station is operated by International Nickel Co., Inc., on a cooperative basis. So far, the Harbor Island project has tested more than 60,000 specimens since it was instituted 16 years ago.

For Mid Continent service, call on J. B. Gill Company's Tulsa office

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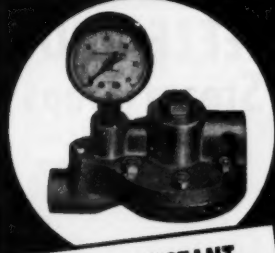
We invite your inquiries



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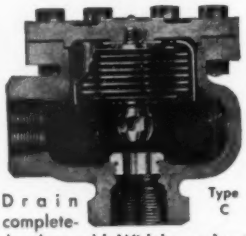

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from the Brazos River through a canal.

A cooling tower has been installed and a treating plant, now under construction, is due to be completed next month. Approximately 15,000 gal. of water is circulated per minute throughout the plant.

Steam capacity has been increased by 50,000 lb. with the installation of new boilers. A desalter also has been installed, and the crude unit has been revamped.

More Acid Needed

PAD seeks 1,000,000-lb. boost in naphthenic output

WASHINGTON. — An increase of 1,000,000 lb. a month of naphthenic acid is being sought by the Petroleum Administration for Defense.

Present production of the acid, which was put under allocation by the National Production Authority last April, has not been disclosed, but it is believed the expansion sought by PAD is in the nature of possibly 75 per cent or more.

Questionnaires out.— As a first step toward increased output PAD has distributed a questionnaire to 35 refiners throughout the county—those east of the Rocky Mountains who produce 10,000 bbl. per day or more of distillate fuels and those on the West Coast running 20,000 bbl. or more of crude oil daily—to determine what production facilities are or can be made available. The distinction between the groups, it was explained, was made because crudes produced east of the Rockies are usually low in naphthenic content, which those produced in the West are high.

Most naphthenic acid at present comes through recovery from caustic solutions, a process normally used only on distillate products from highly naphthenic crudes. However, PAD officials said the sharply increasing demand makes it necessary to examine the possibilities of less-attractive sources of supply. There is a particular need for naphthenic acid with a 210 acid number, it was said.

Land Title Said Delaying Big du Pont Petrochem Plant

BEAUMONT, Tex.—E. I. du Pont de Nemours & Co., Inc., is reported to be planning a $100,000,000 petrochemical plant south of this city, if title to 700 acres of optioned property can be cleared by December 21.

Several blocks have been cleared away, and a local navigation commission is now engaged in trying to persuade U. S. Army engineers that they should surrender their claims to the property.

The engineers have been using the land as a dumping ground for spoil from dredging operations on the adjacent Sabine-Neches waterway. They are reported to be seeking comparable facilities elsewhere or compensation for any additional costs incurred in transporting the spoil over a greater distance.

The navigation district will be asked to use tax money earmarked for development of the waterway to build levees which would open property near the plant site to spoilage operations. If this is found to exceed the commission's authority, it is reported an attempt will be made to raise the money privately.

No official announcement as yet has been forthcoming from du Pont as to the nature of the petrochemicals the plant would manufacture.

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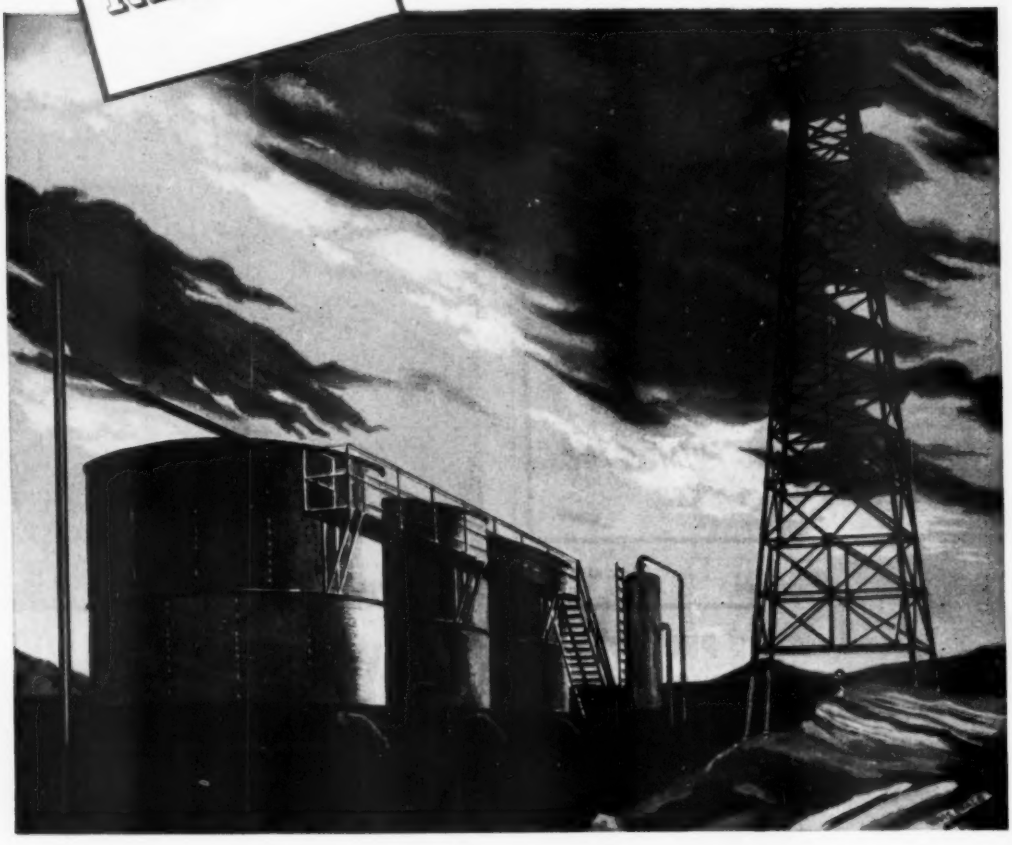

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LEADING THE FIELD OF SEISMIC EXPLORATION

Reef Found in Oklahoma Panhandle

THE high-gravity oil recovered on a drill-stem test of Flynn Oil Co. 1 School Land in Beaver County, Oklahoma, came from an interval that samples show to be Pennsylvanian reef comparable in age to that found in Scurry County, Texas. The significance of that fact needs no elaboration.

Olney Flynn's well, SE SE SE 35-5n-23eCM, has set pipe about 10 ft. off bottom, which was called at 5,554 ft., and is preparing to run production tests. A drill-stem test of this 10-ft. interval flowed water-free oil at an estimated rate of 50 bbl. hourly.

Top of the Kansas City has been called at about 4,570 ft., but correlations below that point are yet to be established. A highly porous section was encountered between 4,750 ft. and total depth in this indicated discovery. The first eight drill-stem tests recovered salt water, but five of the eight tests also yielded varying amounts of oil along with it. The best of these tests was at 4,771-82 ft. It had gas in 8 minutes with a recovery of 1,410 ft. of light oil and 940 ft. of salt water. The oil recovered on these tests is much lighter than the oil found in the Kansas City to the northeast in Kansas.

Following the discoveries of the spectacular oil-bearing reefs in Alberta and Scurry County, Texas, many oil hunters of this country became reef-drunk. These men were seeing reefs where others saw nothing but limestone—the northern Anadarko basin was such a place.

It has long been known that the Pennsylvanian clastics of the southern portion of the Anadarko basin grade into limestones as the Kansas border is approached—that the sandstones become less numerous and prominent limestones take their places. This change comes rather abruptly near the northern rim of the deeper portion of the Anadarko basin at the beginning of a post-Springer (lowermost Pennsylvanian), structural-erosional shelf that runs on up into Kansas and is included in the greater Anadarko basin.

Those who had reef theories for this area saw an ideal location for Pennsylvanian reef buildups along the southern edge of this shelf and now Flynn's well has proved them right.

Though massive limestone development is well known in the Lansing-Kansas City section to the northeast in Kansas and on down into this general area of Oklahoma, Flynn's wildcat is the first well to find a massive, porous limestone continuing downward beyond the normal thickness for the Kansas City limestone in this area. This greater thickness of porous limestone has led some geologists to believe that the well entered Marmaton reef 200 ft. or more up from the bottom of the hole—that reef building along the edge of the shelf started in Marmaton time and continued right on up into the Kansas City. To date, however, only the bottom 10 ft. of hole has been established as being in reef material and age determination is still pending.

Geologists have pointed out many reasons why the northern portion of the Anadarko basin should some day be producing oil. This area offers both structural traps and sedimentary wedges in Pennsylvanian, Mississippian, and Devonian rocks. Reef development in the Pennsylvanian rocks has now been added to the list.

The problem of oil hunters in this potentially productive portion of the Anadarko basin has been the difficulty of pinpointing locations for wildcats. As brought out on this page in the May 24 issue, surface mapping is not reliable, core-drilling results will drive you crazy, and seismic work, because of shallow high-velocity beds, has proven unsatisfactory.

Flynn's well was located without the aid of more than regional geology. Near-future wildcat locations in the area, and if Flynn's well lives up to indications there will be many, will have to be based on trends until there is a sufficient concentration of wells to get subsurface control.

Flynn said his well might flow buttermilk when it is opened up. Though that is unlikely, regardless of what it flows another reef play is already well under way. *Philip C. Ingalls.*

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

ROCKY MOUNTAIN AREA.—Shell Oil Co.'s Richey area wildcat is decreasing in oil production and increasing in salt water as testing of the Charles continues on the northeastern Montana discovery. Shell has announced location for a new wildcat in the area. The California Co.'s Bottineau County, North Dakota, wildcat is now below 6,325 ft., possibly in Ordovician. Sinclair Oil & Gas Co. made an interesting discovery in the East Salt Creek area, Wyoming. Stanolind Oil & Gas Co. and Continental Oil Co. are drilling for a test of Madison in the new Johnson County, Wyoming, Tensleep discovery at North Fork.

WEST TEXAS.—First attempt to produce the Spraberry in Pegasus field was under way at Republic Natural 2 American Republics, in SW SW Section 6, Block 40, Upton County side. The one-time Ellenburger producer was to be perforated at 7,660-7,700 ft. Deeper pay, in the lower Devonian, was indicated at Phillips Petroleum 1-DD University, west offset to the Martin-Wolfcamp discovery in Andrews County. The 1-DD apparently missed the regular pay but flowed 16 bbl. of oil an hour on drill-stem test in chert at 8,200-49 ft.

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Kansas

Two New Pools Indicated By Rooks County Tests

A NEW productive area, located a mile east of the Jelinek pool and about the same distance north of the Baumgarten pool, is being opened in southwestern Rooks County. Prospective discovery well is Mid Plains Oil Corp. and B & R Drilling Co. 1 Mayhew, NE NE SE 24-9-19, now testing Arbuckle lime, topped at 3,611 ft. (—1,412 ft.), and open at 3,612-17 ft. (total depth). It produced 28 bbl. by swabbing during the first 4 hours.

Mid States Oil Corp., operating jointly with Westgate-Greenland Oil Co., has another prospective discovery well in the same county at 1 Casey, NW NW SW 15-9-19, where casing has been cemented to test showings found in both the Arbuckle and the Lansing-Kansas City zones. Total depth is 3,511 ft. with casing at 3,506 ft., 1 ft. in the top of the Arbuckle. No drill-stem test was made in the latter pay, but a test at 3,237-54 ft. in the Lansing-Kansas City zone, topped at 3,264 ft., got 240 ft. of free oil along with 150 ft. of oil-cut mud, and 60 ft. of water. Tester was open 60 minutes. Location is a mile west of the Chandler pool.

Alpine Oil & Royalty Co. found promising oil showings in the Lansing-Kansas City zone at its 1 Dorfshaffer, SE SE NE 34-19-13, a wildcat just east of Great Bend, southern Barton County. A 30-minute drill-stem test at 3,173-3,245 ft. in the upper part of the zone, topped at 3,171 ft. (—1,333 ft.), yielded 720 ft. of heavily oil and gas-cut mud and 90 ft. of gas-cut mud. Hole is being deepened to the Arbuckle. This location is about 2½ miles southwest of the new Fort Zarah pool, where good production is being developed.

In northwestern Ellis County, Heathman & Co. and Derby Oil Co. are putting their 1 Keller, SW SW NW 6-11-19, on the pump after swabbing tests of the Lansing-Kansas City which produced at an average rate of 8 bbl. of oil per hour. The well tested water and a small show of oil in the Arbuckle at a total depth of 3,707 ft. The Lansing-Kansas City zone, to which the hole was plugged back, is open through casing perforations at 3,536-44 ft. Top of the latter pay is 3,385 ft. (—1,252 ft.). Nearest production is in the Warren pool, a mile to the southeast.

KANSAS SUCCESSFUL WILDCATS

Barton County: Rockett Drilling Co. 1 Putnam, NW NW NW 7-17s-13w, pumped 212 bbl. oil and 9 bbl. water daily from Lansing-Kansas City at 3,286-93 ft. TD 3,489 ft., PBTD 3,412 ft. Lansing-Kansas City 3,224 ft. Arbuckle 3,454 ft.

Cowley County: Smitherman & Cohen 1 McKay, SE SE NW 17-35s-4e, flowed 138 bbl. oil per day from Bartlesville sand at 3,314-25 ft. TD 3,325 ft.

KANSAS WILDCAT FAILURES

Barton County: T. H. Mastin 1 Steffan, NE NE NW 21-19s-11w, dry, TD 3,388 ft. Sooy 3,366 ft.

L. Phillips et al 1 Putnam, NW NW NE 7-17s-13w, dry, TD 3,331 ft. Arbuckle 3,326 ft.

Butler County: White & Ellis 1 Sluss, NE SW NE 36-26s-5e, dry, TD 2,810 ft. Mississippian 2,780 ft.

D. T. Ingling 1 Hoss, SE SE SE 34-23s-4e, dry, TD 2,520 ft. Mississippi lime 2,478 ft

Cowley County: S. H. Sampson and W. O. Cooper 1 Walter Hunt, SE SW SW 25-33s-3e, dry, TD 3,319 ft. Mississippian 3,319 ft.

Ellis County: G.M.R. 1 Granberry et al, NE NE NE 13-13s-18w, dry, TD 3,740 ft. Sooy 3,728 ft.

Rocket Drilling Co. 1 Kramer, SE SE SE 7-14s-19w, dry, TD 3,866 ft. Arbuckle 3,830 ft.

J. Lindas 1 Thayer, SE SE NW, 20-11s-20w, dry, TD 3,900 ft. Arbuckle 3,846 ft

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Ellsworth County: Duke & Wood-Bay Petroleum 1 C. Frevert, SW SW NW 16-17s-10w, dry, TD 3,331 ft. Arbuckle 3,326 ft.

Bishop Oil Co. et al 1 Janssen, NW NW SE 36-16s-9w, dry, TD 3,306 ft. Arbuckle 3,288 ft.

Gove County: Argo Oil Co. 1 Hockersmith, NW NW NW 19-14s-29w, dry, TD 4,507 ft. Marmaton 3,945 ft.

Musgrove and Republic Natural 1 Stewart, SW SW NW 12-11s-31w, dry, TD 4,706 ft. Maraton 4,259 ft.

Graham County: Heathman 1 Miller, NW NW SE 15-10s-21w, dry, TD 3,946 ft. Marmaton 3,789 ft.

Grant County: Stanolind Oil & Gas Co. 1 McGannon, NE NE NE 5-29s-38w, dry, TD 4,601 ft. Lansing-Kansas City 3,992 ft.

Greenwood County: Raymond Smith 1 Smith, SW SW NE 6-26s-11e, dry, TD 2,287 ft. Arbuckle 2,284 ft.

Associated Resource 1 Saniter, NW SE NW 1-25s-11e, dry, TD 18,99. Mississippi lime 1,834 ft.

Hodgeman County: H. Koplin and M. B. Armer 1 Housman, NE NE SW 1-23s-22w, dry, TD 4,580 ft. Cherty Mississippi lime 4,537 ft.

Marion County: J. C. Fisher and C. R. Swan 1 C. B. Riggs, SE NW NE 14-21s-4e, dry, TD 2,458 ft. Viola 2,444 ft.

Meade County: Northern Natural 1 Weaver, C NE NW 33-30s-29w, dry, TD 5,932 ft. St. Louis 5,649 ft.

Rice County: Stag 1 Rife, NW NE SW 9-19s-7w, dry, TD 3,615 ft. Arbuckle 3,592 ft.

Rooks County: C. Todd 1 McCormick, NW NW SE 6-8s-19w, dry, TD 3,420 ft. Arbuckle 3,358 ft.

Deep Rock 1 Baldwin, NE SE NE 35-8s-20w, dry, TD 3,636 ft. Arbuckle 3,606 ft.

Sedgwick County: Greeley Drilling Co. 1 Miller, NE NW SW 23-27s-2w, dry, TD 4,601 ft. Lansing-Kansas City 3,992 ft.

Stafford County: Petroleum, Inc. 1 C. H. Harter, SW NW SW 9-21s-13w, dry, TD 3,689 ft. Arbuckle 3,639 ft.

Petroleum, Inc. 1 Hullerett "B," NW SW SW 9-21s-14w, dry, TD 3,691 ft. Arbuckle 3,671 ft.

Minhardt & Beebee et al 1 Hobbs, SE NE NW 29-22s-14w, dry, TD 4,070 ft. Arbuckle 4,032 ft.

Trego County: Vickers Petroleum 1 Hillman, NW NW SE 10-11s-22w, dry, TD 3,900 ft. Arbuckle 3,846 ft.

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Texas Gulf Coast

Calhoun County Wildcat Drill-Stems Good Oil Shows

HOUSTON. — Southern Minerals Corp. 1 W. L. Traylor, wildcat 1¾ miles west-northwest of Point Comfort gas production, Calhoun County, recovered good shows of oil on a series of drill-stem tests.

On 15-minute test at 7,518-½-21½ ft., using ¼-in. chokes the well developed 500 psi. working pressure at the surface, and recovery was 300 ft. of pipe-line oil. A 20-minute test at 7.521½-25½ ft. recoverd 40 ft. of oil-cut mud with 32 psi. working pressure. A lower test at 7,627-32 ft. with ¼-in. choke developed 40 psi. pressure with recovery being 50 ft. of oil-cut mud, 50 per cent oil. Another 20-minute test at 7,636-44 ft. with ¼-in. choke showed working pressure of 275 psi. and recovery of 190 ft. of oil, 90 ft. of oil-cut mud, and 750 ft. of salt water and sand. This potential discovery is 8 miles northeast of Port Lavaca.

New Frio pay has been established 1 mile south of East Placedo field, Victoria County, at Sunray Oil Corp. 16 J. Pickering. On potential test, the well flowed 81 bbl. of oil daily through 7/64-in. choke from perforations at 5,895-98 ft. Tubing pressure registered 800 psi and casing pressure 1,050 psi The well is bottomed at 7,800 ft with 5½-in. production string cemented to 7,050 ft. Location is in J. W. Black Survey, Abstract 133.

James G. McCarrick, trustee, has set pipe in 1 Lulu Allen Estate, wildcat 2 miles east of Provident City field, Lavaca County, and is preparing to test an oil sand at 9,149-64½ ft. A gas sand with water was encountered at 9,169-9,233 ft. The wildcat is located in R. P. Allen Survey 18, A-707.

Hamman Oil & Royalty Co. is preparing to install pump at its new Fayette County discovery, 1 Frank Weidel et al, located 4½ miles southwest of Muldoon. The well swabbed an unestimated amount of 21°-gravity oil from the Carrizo Wilcox at 2,361-64 ft.

A new and deeper gas sand has been opened in the Lucky field area of Matagorda County at Stanolind Oil & Gas Co. 1 F. F. Insall. On open-flow gage, the well flowed 23,000,000 cu. ft. of gas daily from perforations at 10,118-32 ft. Shut-in pressure was 1,087 psi. On choke, the well flowed 6,000,000 cu. ft. of gas daily and 18 bbl. of condensate.

TEXAS GULF COAST (DISTRICTS 2 AND 3) SUCCESSFUL WILDCATS

Chambers County: Gas-condensate discovery—Standard Oil Co. of Texas 1 W. F. Gau, John S. Roberts Sur., A-21, TD 9,017 ft., perf. 8,272-86 ft., IP: 74 bbl. condensate per day, 55° gravity.

Grimes County: Oil discovery—Gulf Oil Corp. 1 William Gardner, James W. Darwin Sur., A-117, TD 10,723 ft., Wilcox 10,392-10,405 ft., IP: 142 bbl. oil per day, 9/64-in. choke, 35° gravity, TP 975 psi.

Wharton County: New pay at Boling Dome—Michael T. Halbouty et al, A-1 Gary Estate, Seth Ingram Sur., A-33, TD 7,213 ft., perg. 6,834-40 ft., IP: 169 bbl. oil per day, 9/64-in. choke, 26.4° gravity, 880 psi.

TEXAS GULF COAST (DISTRICTS 2 AND 3) WILDCAT FAILURES

Galveston County: John W. Mecom-Dan J

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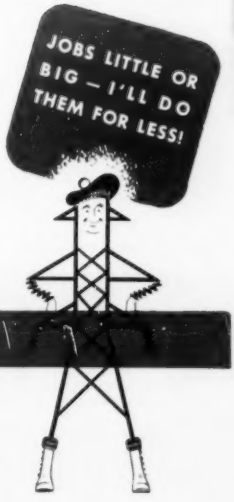

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EXPORT DISTRIBUTOR: Lucey Export Corporation, 233 Broadway, New York 7, New York — Broad Street House, London E. C. 2, England

Harrison, Jr., 1 University of Texas, Sam Bundick Sur., A-7, dry, TD 7,405 ft.

Jackson County: Robert Y. Walker & Roy Davis 1 O. E. McNeil et al, J. Andrews Sur., 7 mi. NW of Edna, dry, TD 2,724 ft.

Lavaca County: Boyce-Smiser-Runion Oil Co. 1 Agnes Pohl, Moses Wooten Sur., A-496, dry, TD 3,010 ft.

Commercial Petroleum & Transport Co. 1 Arthur E. Evans, John J. Mays Sur., A-309, dry, TD 8,273 ft.

Montgomery County: Moran Corp. A-2 Hutchings-Sealy National Bank Trustee, J. C. Pitts Sur., 6 mi. NE of Conroe, dry, TD 11,555 ft.

Refugio County: Hassie Hunt Trust 1 Jack Robbins, T. T. Williams Sur., A-312, dry, TD 8,937 ft.

Permian Basin

Wilshire-Ellenburger Field Gets Third Largest Oiler

MIDLAND.—The tenth producer in the Wilshire-Ellenburger field of Upton County, and the eighth well for Sinclair Oil & Gas Co., has been completed for a daily potential of 3,170 bbl. of high-gravity oil a day. The high potential was third largest for that field.

The new well is Sinclair 5 McElroy Ranch and completion was through open 2-in. tubing from pay at 12,265-12,325 ft. Flowing pressure was 400 psi. Top of the pay section was 12,017 ft., on elevation of 2,800 ft. Location in Section 129 is about ½ mile north of the field discovery.

Three miles north of production, Sinclair 6 McElroy ran into mechanical trouble in attempting a drill-stem test at 12,669-13,707 ft. It was to be drilled ahead before making another test. Top of the Ellenburger was 12,548 ft., minus 9,667 ft.

Meanwhile Greenbrier Oil Co. 1 E. Windham, 14,000-ft. operation southeast of Wilshire field prepared to core ahead from 11,236 ft., after testing in the Devonian. Top of that formation, on elevation of 2,832 ft., was 11,160 ft. Drill-stem test from 11,165-11,213 ft. recovered 30 ft. of mud in 2 hours. Recovery from 11,915-80 ft. was 500 ft. of gas and salt water-cut mud, with 2 in. of heavily oil-cut mud in the bottom.

The well had previously shown for possible production in the Pennsylvanian. Tests at 10,112-39 ft. and 10,134-70 ft. developed some free oil.

In Martin County, Argo Oil Co. 1 Brown, 15-36-T&P, recently dry at 10,604 ft. in the Pennsylvanian, was reported to be showing oil and gas seepage, and operators prepared to move in a rig to look for the shows. Location is some 16 miles northeast of Stanton.

Argo Oil Co. 1 Cook, Glasscock County wildcat 3 miles southwest of Garden City, had prospects of production in the Wolfcamp. Swabbing in open hole between 7,350-7,501 ft. developed 18 bbl. of oil with no water in 24 hours. When let stand, fluid rose 400 ft. in 2 hours. The section was to get a heavy acid treatment.

Sinclair 1 Long, about 4 miles east of Garden City, reported oil and good porosity in samples from the Wolfcamp. A 3-hour drill-stem test from 7,880-8,010 ft. recovered 1,410 ft. of oil and gas-cut mud. Operators were drilling ahead at 8,416 ft. on an Ellenburger contract.

Honolulu Oil Corp. 1 A. A. Sugg, ½-mile stepout to Atlantic's Spraberry discovery, kicked off after fracturing the Spraberry in open hole from 5,520-5,373 ft., flowing 250 bbl. of fluid through open tubing in 2 hours. Half of the fluid was oil. It was shut in for storage and completion.

Sohio Petroleum Co. 1 Caudle, wildcat between the Weiner Floyd and North Pembrook fields, was drilling shale at 7,294 ft.

The Texas Co. 1-1 TXL, south extension to the Hi-Lonesome Wolfcamp and Pennsylvanian field of Midland County, had flowing oil on a drill-stem test in the Wolfcamp between 9,660-9,763 ft. Oil reached the surface in 3 hours and 35 minutes. The well made 17 bbl. of oil the first 30 minutes, then 8½ bbl. in 10 minutes, then died. It was to drill ahead to the Pennsylvanian.

Gulf Oil Corp. 7-E Estes, 3-28-PSL, on the west side of the West Sand Hills-Holt field, and about 4 miles west of nearest Ellenburger production, kicked off after treating with acid through perforations at 7,925-50 ft. and 7,970-95 ft. It cleaned into pits for 30 minutes then gaged 108 bbl. of 45°-gravity oil through open tubing in 3 hours.

WEST TEXAS (DISTRICTS 8 AND 7-C) SUCCESSFUL WILDCATS

Crockett County: Otto Engel 1 Halff, 521-1H&GN, TD 1,820 ft., Burgess 1,688 ft., IP pumped 33 bbl. 32°-gravity oil.

Dawson County: C. L. Norsworthy, Jr. and Jay Simmons 1 G. C. Wright, 19-1-J. Poitevant Sur., TD 7,323 ft., elev. 2,837 ft., Spraberry 7,175 ft., IP pumped 162 bbl. 42°-gravity oil.

Midland County: The Texas Co. 1-B NCT-2 Scharbauer, 43-39-T2S-T&P, TD 8,050 ft., pay 7,770 ft., IP pumped 44 bbl. 33°-gravity oil.

Schleicher County: Standard Oil Co. of Texas 1-3 Mrs. C. Mittel, 78-TT-TCRR, TD 6,317 ft., elev. 2,317 ft., pay 6,217 ft., IP 1,291 bbl. 47°-gravity oil, ¾-in. choke, GOR 727 cu. ft., TP 473 psi.

Sutton County: Shell Oil Co. 1 W. A. Miers, 54-14-TW&NG, TD 4,377 ft., PB 4,333 ft., IP 22,000,000 cu. ft. gas, distillate not reported.

WEST TEXAS (DISTRICTS 8 AND 7-C) WILDCAT FAILURES

Borden County: American Oil Corp. 1-C Griffin, 46-25-H&TC, dry, TD 7,245 ft., reef 7,215 ft.

Coke County: J. K. Blackman 1 R. L. Page, Sec. 11, J. W. Childress Sur., dry, TD 6,877 ft., Palo Pinto 5,400 ft., Strawn 5,668 ft.

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277-1A-H&TC, dry, TD 6,600 ft., elev. 2,152 ft., Odom lime 6,140 ft., Ellenburger 6,450 ft.

Crockett County: Southland Royalty Co. 1-8 J. S. Todd, 8-WX-GC&SF, dry, TD 8,155 ft., elev. 2,250 ft., Spraberry 4,090 ft., Dean 5,190 ft., Strawn 5,614 ft., Ellenburger 7,410 ft.

Dawson County: Tide Water Associated Oil Co. 1 J. F. Stockes, 3-C39-PSL, dry, TD 12,397 ft., elev. 3,161 ft., Spraberry 7,584 ft., Dean 8,850 ft., Fusselman 11,940 ft., Ellenburger 12,335 ft.

Garza County: George Callighan 1 Irene Rogers, 107-5-H&GN, dry, TD 2,977 ft.

Glasscock County: Plymouth Oil Co. 1 S. C. Currie, 45-32-T4S-T&P, dry, TD 2,991 ft., elev. 2,499 ft., Clear Fork 2,860 ft.

Howard County: Deep Rock 1 J. C. McCrary, 1-33-T1N-T&P, dry, TD 9,267 ft., elev. 2,643 ft., Spraberry 6,225 ft.

Kimble County: Anderson-Dunham 1 R. F. Cannon, R. Cochran Sur. 741, dry, TD 250 ft., Ellenburger 90 ft.

Anderson-Dunham 1 W. K. Fisher, I. Fuller Sur. 25, dry, TD 1,685 ft.

Martin County: Argo Oil Corp. 1 R. B. Brown, 15-36-T2N-T&P, dry, TD 10,606 ft., Spraberry 7,482 ft., Dean 8,788 ft., Strawn 10,500 ft.

Pecos County: Patrick A. Doheny 1-B M. I. Masterson, 26-140-T&STL, dry, TD 5,456 ft., elev. 2,518 ft., Ellenburger 4,830 ft.

Runnels County: Dalport Oil Corp. 1 W. T. Riley, G. W. Dwyer Sur. 482, dry, TD 2,570 ft.

Geo. P. Livermore, Inc. 1 Emma Lee, 77-370-R. B. Croft Sur., dry, TD 5,355 ft., Palo Pinto 4,014 ft.

Warren Oil Corp. 1 W. Hoppe, J. J. Taylor Sur. 541, dry, TD 4,471 ft., Palo Pinto 3,451 ft., Gardner 4,134 ft., Caddo 4,730 ft.

Schleicher County: James C. McCarrick 1 E. C. Wilson, 80-M-GH&SA, dry, TD 6,311 ft., elev. 2,240 ft., Strawn 5,852 ft.

Terry County: J. C. Williamson 1-A Gunn, 7-C39-PSL, dry, TD 4,938 ft., elev. 3,155 ft., San Andres 4,460 ft.

Tom Green County: Fullerton Oil Co. 1 K. L. Harris, 64-25-H&TC, dry, TD 5,850 ft., elev. 2,291 ft., Canyon sand 4,670 ft., Palo Pinto 4,512 ft., Strawn 5,286 ft., Ellenburger 5,726 ft.

TEXAS PANHANDLE (DISTRICT 10)

A step-up in leasing activity for the Panhandle portion of the Anadarko basin has resulted from a flowing oil discovery in Beaver County, Oklahoma.

Lipscomb, Ochiltree, Hansford, Hemphill, Roberts, and Hutchinson counties have reported a boom in lease transactions. One company is credited with taking more than 15,000 acres in a fast-breaking Lipscomb County play.

Lease men from several companies new to the area are taking part in the play brought about by the discovery, Flynn Oil Co. 1 School Land in Beaver County. In a drill-stem test run from 5,514-54 ft., gas came to the surface in 3½ minutes, and oil flowed in 1 hour, 40 minutes. Recovery was 5,524 ft. of clean light oil. The well was shut in.

Location of the test is 25 miles north of the Texas-Oklahoma state line in the Oklahoma Panhandle portion of the basin. Bonus payments in the counties nearest the well are ranging from $2 to $25 per acre.

Another Anadarko basin wildcat in Ochiltree County is testing oil shows recovered from 6,065-6,100 ft. in Pennsylvanian. A drill-stem test is presently being made at Sinclair 1 Hoover, 4 miles northeast of The Texas Co. 1 Flowers, new oil discovery for the county. Production in the 1 Flowers is from Atoka at 8,864-79 ft.

A shallow wildcat in Hartley County, Kerr-McGee 1 Berneta, is swabbing and testing acidized zones at 3,737 ft., after recovering oil shows from 3,672-76 ft. and 3,714-16 ft. The 1 Berneta is a stepout west of Moore County Permian gas production.

A 7,500-ft. wildcat is to be drilled in Deaf Smith County 22 miles northwest of Hereford. N. B. Hunt 1 Overstreet is to test formations at the extreme western edge of the presently unproductive Palo Duro basin. Location is in Section 79, Block K-7, BS&F Survey.

Another H. L. Hunt wildcat in Briscoe County, the 3 Ritchie, has been plugged with no shows reported. Total depth of the well was 6,757 ft. in lime. A fourth Ritchie wildcat is presently drilling in Armstrong County below 3,850 ft.

TEXAS PANHANDLE (DISTRICT 10) WILDCAT FAILURES

Briscoe County: Amerada Petroleum Corp. 1 Hamilton, 41-3-T&P, dry, TD 8,775 ft., elev. 2,474 ft.

SOUTHEAST NEW MEXICO WILDCAT FAILURES

Eddy County: Resler & Sheldon 1 Conoco-State, 24-20s-27e, dry, TD 801 ft., elev. 3,385 ft., estimated, Grayburg 773 ft.

Stansbury & Webb Co. 1 Kinahan-Federal 30-25s-29e, dry, TD 2,871 ft., elev. 2,921 ft., Delaware lime 2,757 ft., sand 2,786 ft.

Oklahoma

Beaver County Wildcat Waits Production Test

FLYNN OIL CO. is preparing to start production tests at its 1 School Land, rank wildcat oil discovery well on the north rim of Anadarko basin in Beaver County, Oklahoma Panhandle. The well, located in the SE SE SE 35-5n-23eCM, 8 miles northwest of the town of Beaver, showed for prolific production on a drill-stem test from a formation as yet undetermined as to age but believed to be in the Marmaton.

The prospective pay zone is a soft, limy formation, logged at 5,539-49 ft., which drilled at the rate of 1½ minutes per foot. A drill-stem test, open 1 hour and 49 minutes, got gas to the surface in 3½ minutes and flowed at an estimated rate of 50 bbl. of oil per hour during the final 4 minutes. Gas flow was estimated at 500,000 to 600,000 cu. ft. per day. In the breakdown, there was 5,520 ft. of oil in the pipe. Gravity of the oil was 36.5°. No water was evident. Following the test, 7-in. casing was run to 5,540 ft., 1 ft. in the pay.

The well had the top of the Kansas City lime at 4,584 ft. (surface elevation 2,503 ft.). Showings were encountered through that section and a series of eight drill-stem tests were made, but most of them got mostly salt water. Hole was being deepened to the Morrow (basal Pennsylvanian) formation when the present indicated productive horizon was encountered.

Location of the well is more than 9 miles from nearest production of any kind, this being in the Adams Ranch gas-distillate area in southern Meade County, Kansas. It is 12 miles southeast of the Light Ranch gas-distillate area on the state line of Beaver County, Oklahoma, and Seward County, Kansas.

In the meantime, another deep Anadarko basin wildcat, Continental Oil Co. 1 Kimball, NW NW SW 34-20n-16w, 4 miles southeast of Chester, in Major County, has found promising gas-distillate productive indications in Chester lime (Mississippian). These showings, however, have been passed up for the time being with hole being deepened in exploration of possible lower productive horizons.

Top of the Chester lime in this well was logged at 8,368 ft. A soft lime interval was topped at 8,384 ft., in which hole was carried to 8,428 ft., where a drill-stem test was made. With tool open 74 minutes, gas was at the surface within 16 minutes. Flow, carrying a light, distillate spray, was estihated at 5,000,000 cu. ft. per day. The breakdown recovered 1,710 ft. of 56.5°-gravity distillate with an additional 270 ft. of mud, cut with gas and distillate. Flowing pressure was 2,150 psi.

A new Wilcox sand pool, located just south of Chandler, in Lincoln County, apparently has been uncovered by H. Waggoner & Co. at its 1 Adam, NE SW SW 15-14n-4e. With casing at 5,046 ft. on top of the first Wilcox sand, hole was drilled in to its total depth of 5,055 ft., and filled 600 ft. of oil in 45 minutes. Operators at latest report were running tubing and setting up tanks for production tests.

W. A. Moncrief and associates appear to have a good Hunton lime well in their 1 Harjo, SE SW SW 5-12n-7e, a wildcat northwest of the Paden field, in western Okfuskee County. The well flowed at an estimated rate of 25 bbl. of oil per hour for 45 minutes from casing perforations at 4,230-64 ft. Flow was through open tubing after 4 000 gal. of acid had been injected. This is a hole drilled about a year ago by J. A. Chapman. Total depth is 4,543 ft. Present operators recently took it over, cleaned out and ran 7-in. casing to 4,338 ft.

OKLAHOMA SUCCESSFUL WILDCATS

Garvin County: W. C. Jackson 1 Dixon, SW SE SE 9-3n-1e, flowed 153 bbl. oil daily from 3,465-74 ft., TD 3,474 ft.

Lincoln County: Johnson Oil & Refining Co., NW SW SE 35-17n-5e, flowed 23 bbl. oil daily from Bartlesville at 3,504-ftt ft., TD 3,522 ft., Bartlesville 3,502 ft.

Love County: Continental Oil Co. 1 Moxley, SW SW SW 10-6s-1w, pumped 43 bbl. oil daily from Deese sands between 7,252 and 7,314 ft., TD 8,506 ft., PDTD 7,400 ft.

Marshall County: The Texas Co. 1 F. A. Chapman, SW NW SE 35-4s-4e, flowed 112 bbl. oil daily from McLish at 924-950 ft., TD 3,048 ft., PBTD 965 ft. Arbuckle 2,260 ft.

Noble County: Randall R. Morton and O. & L. Drilling Co. 1 Marshall, NE NE NE 26-22n-2e, flowed 124 bbl. oil and 18 bbl. water daily from first Wilcox at 4,564-69 ft., TD 4,628 ft.

Payne County: Deep Rock Oil Corp. 1 Duncan, NE SW SE 4-19n-6e, pumped 16 bbl. oil and 3½ bbl. of water daily from lower Skinner at 3,030-39 ft., TD 3,601 ft.

Blackwell Oil & Gas Co. 1 Garrish, NE NE SE 20-18n-18, flowed 182 bbl. oil plus 6 bbl. of water daily from Wilcox at 5,205-38 ft., TD 5,238 ft.

Pawnee County: Josaline Production Co. 3 Eye Bear, SE SW NW 35-21n-5e, flowed 240 bbl. of 37°-gravity oil and 75 bbl. of water daily from Red Fork at 3,223-30 ft., TD 3,230 ft.

Pontotoc County: S. C. Yingling (formerly Mizel Brothers) 1 Floyd, NW NE NE 30-4n-5e, pumped 17 bbl. oil daily from perf. at 1,545-70 ft., OWWO, OTD 1,579 ft., PBTD 1,574 ft., Viola 1,466 ft., chert 1, 535-74 ft.

Stephens County: Sunray Oil Corp. 1 Hurst, NW NE SW 31-1s-6w, pumped 5 bbl. oil daily from perf. at 4,168-87 ft., TD 6,300 ft., PBTD 4,211 ft. Arbuckle 6,238 ft.

OKLAHOMA WILDCAT FAILURES

Comanche County: H. A. Kroeger 2 Burtram, SE NW NE 27-1n-10w, dry, TD 218 ft.

Cotton County: S. F. Hutchinson 1 Mike Stiokoff, SW SE SE 25-1s-12w, dry, TD 2,335 ft.

Kay County: Smitherman & Cohen et al 1 Conner, SE SE NE 18-29n-3e, dry, TD 3,403 ft. Mississippi chat 3,362 ft.

Oklahoma County: Continental Oil Co. 1 Carrier, SE SE SE 25-11n-1w, dry, TD 7,246 ft. Oil Creek sand zone 7,129-61 ft., Joins 7,161-7,243 ft.

Osage County: Hanlon-Boyle, Inc. 1 Osage, NW SW SW 27-23n-7e, dry, TD 3,072 ft. Arbuckle 3,064 ft.

F. H. Lindsay 1 Osage, SW SW SW 9-26n-10e, dry, TD 2,278 ft. Mississippi lime 2,106 ft.

Pawnee County: Foundation Oil and Anderson-Prichard 1 Jane Sherman, SE SW NE 22-21n-5e, dry, TD 3,180 ft. Red Fork 3,152 ft.

Frank B. Murta, NE NE NE 31-22n-7e, dry, TD 3,148 ft. Arbuckle 3,120 ft.

Payne County: Woods Oil & Gas Co. 1 Otto Grey, NE NE SE 14-19n-3e, dry, TD 4,015 ft. Bartlesville 3,958 ft., Mississippi lime 4,010 ft.

Pottawatomie County: Helmerich & Payne,

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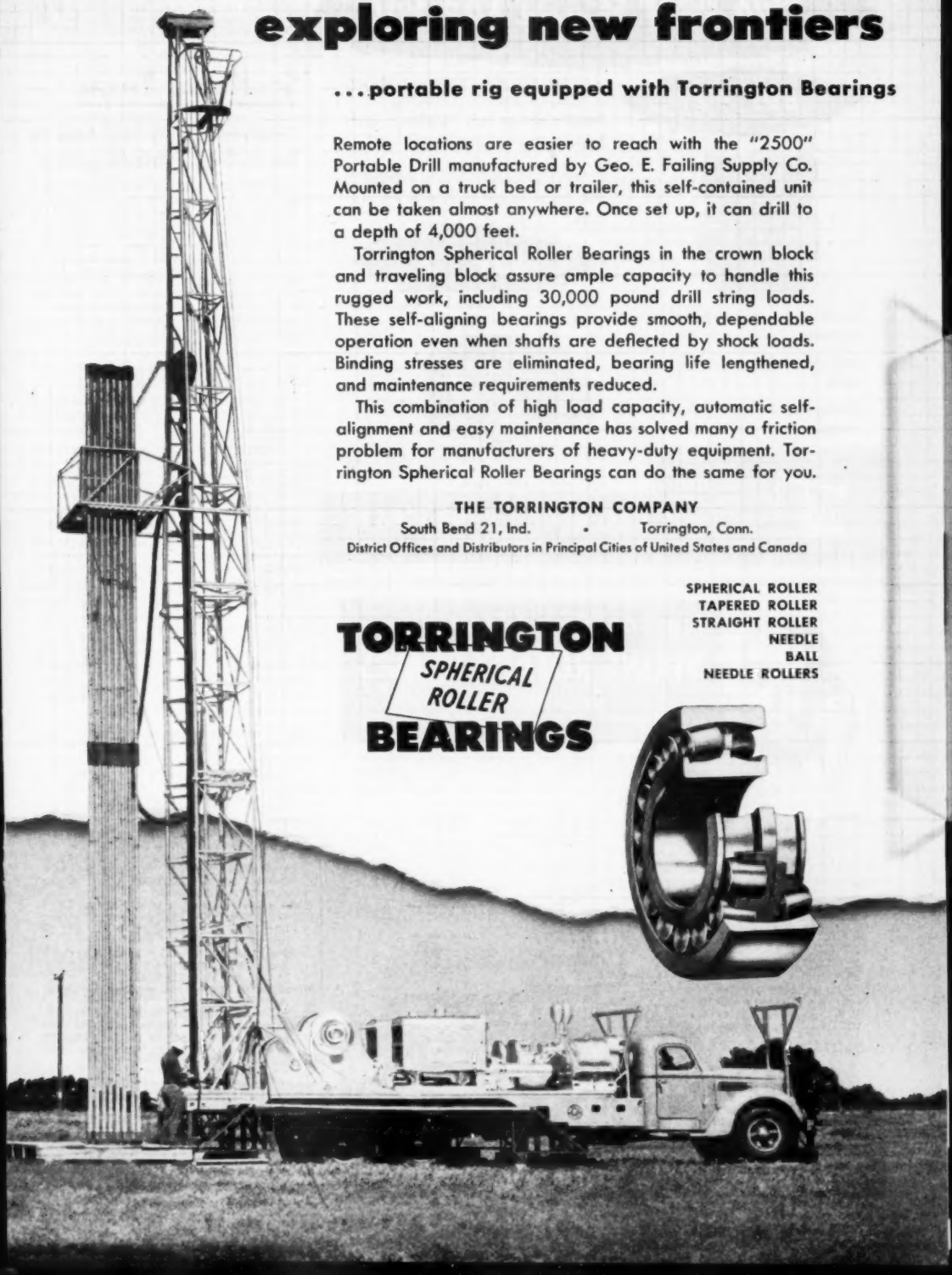

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Stephens County: Stanolind Oil & Gas Co. 2 Doriance, NE NE NE 19-2s-4w, dry, TD 3,002 ft., PBTD 2,370 ft.

Southwest Texas

Cameron County Test Aims at Texas' Deep-Producing Mark

CORPUS CHRISTI.—If current tests in a Cameron County wildcat prove commercial, Texas' producing-depth record will be broken at C. G. Glasscock 1 Mellie Esperson Estate, 12 miles east of Brownsville. At last report, operator had perforated to test gas shows in what is presumed to be the Catahoula at 13,694-704 ft. Hole is bottomed at 14,150 ft. with casing set to 14,137 ft. This wildcat was originally drilled to 11,436 ft. last July. Operator went back in hole, cleaned out, set 7-in. protective casing at 11,429 ft., and started deepening in August.

New gas condensate production has been opened in Nueces County at H. H. McFarland 1 Kate D. Bluntzer, wildcat 5 miles north-northwest of North Agua Dulce production. The well flowed an estimated 50 bbl. of distillate and gas through perforations in the 5,600-ft. zone.

George E. Wrather Oil Co. and Bass-Vessels have gained 1 Hilaria A. De Garza, wildcat discovery 2 miles north of LaReforma field in Starr County. From perforations at 5,942-51 ft., the well flowed 75 bbl. of oil daily through ⅛-in. choke. Tubing pressure on the test was 345 psi., and casing pressure was 990 psi.

George D. Stevens recovered oil on drillstem test at 1 A. M. Bruni Estate, wildcat ¾ mile southeast of Bruni in Webb County. Tool was open 20 minutes and recovery was 200 ft. of oil from perforations at 3,936½-41½ ft. Test developed 41½ psi. working pressure at the surface with bottom-hole flowing pressure of 1,515 psi.

Production has been confirmed in new Stulting field, Gonzales County, at DeLange & Neathery 2 N. C. Stulting. From open hole, the well showed good for 55 bbl. of 21.5° gravity oil daily on pump. Production is from 2,044-57 ft., and total depth of the well is 2,415 ft.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) SUCCESSFUL WILDCATS

Atascosa County: Oil discovery, "Guy Smith"—B. F. Usery 1 Guy Smith, William Waggoner Sur., A-921, Sec. 201½, TD 2,207 ft., open hole 2,204½-07 ft., IP 129 bbl. oil per day on pump, 21° gravity.

Nueces County: New pay at East Flour Bluff—Humble Oil & Refining Co. F-2 East Flour Bluff State, in Laguna Madre Bay State Tract 31, TD 9,298 ft., perf. 8,730-45 ft., IP: 33,000,000 cu. ft. of gas daily, TP 4,700 psi.

Oil discovery—Stanolind Oil & Gas Co. 1 State Tract 414, in Corpus Christi Bay, TD 8,309 ft., perf. 8,002-14 ft., IP: 55 bbl. oil per day.

Oil discovery—Stanolind Oil & Gas Co. 1 State Tract 421, State Tract 421 in Corpus Christi Bay, TD 9,521 ft., perf. 7,285-90 ft., IP: 203 bbl. oil per day, 44° gravity, 9/64-in. choke.

Zapata County: Gas discovery—Earl A. Thompson 2 M. Garza, Sur. 284, TD 1,675 ft., perf. 1,665-70 ft., IP: 4,350,000 cu. ft. of gas daily, open flow, SIP 320 psi.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) WILDCAT FAILURES

Aransas County: Union Producing Co. 6 Tatton, John Durst Sur., A-51, dry, TD 7,476 ft.

Atascosa County: Appell Drilling Co. 2 Dornak, John Gaston Sur. 1,245, dry, TD 1,438 ft.

Bastrop County: Harvey E. Harper, Sr.,

and Chas. S. Passanant III 1 Earl Callahan, L. Leverance League, dry, TD 2,440 ft.

Dimmit County: Howeth & Mason 4 Geo. E. Light, Jr., Sur. 84, A-546, dry, TD 6,921 ft.

Duval County: C. F. Falley 1 Bruno Reyes, Procipio Reyes Sur., A-482, dry, TD 2,734 ft.

Gulf Plains Corp. 1 Nicalos Gonzales, D. Balderas 2 Sur., A-642, dry, TD 5,000 ft.

Frio County: Paisano Trading Co. 1 Dunmore, J. W. Johnson Sur. 2, A-1,362, dry, TD 4,539 ft.

Gonzales County: Quintana Petroleum Co. 1 A. Schnabel, Thos. DeCrew Sur., dry, TD 7,439 ft.

Nueces County: Southwestern Oil & Royalty Co. 1 H. F. Waters, H. T. Cunningham Subd., John Elliff Tract, Block 62, dry, TD 7,500 ft.

Selby Walker Corp. and Joseph T. Dawson 1 Ernest Poenisch et al, Flour Bluff & Encinal Farm & Gardens Tract, Sec. 31, dry, TD 6,634 ft.

Wilson County: Gulf Shore Oil Co. et al, 1 J. Zidek, Don Gasper Flores Sur., A-13, dry, TD 6,128 ft.

Zavala County: The Texas Co. 1 Refinald Johnson et al, C. H. Johnson Sur. 54, A-12228, dry, TD 4,400 ft.

Eastern Texas

Freestone County Wildcat Flowing Gas From Pettit

DALLAS.—Humble Oil & Refining Co. 1 Mrs. A. Watson, Freestone County wildcat 9 miles west of Yard, was reported flowing gas with a trace of distillate.

Initial tests of the Pettit limestone from perforated intervals at 7,762-70 ft., 7,787-94 ft., and 7,896-16 ft. flowed gas at the rate of 1,650,000 cu. ft. daily through ¾-in. choke. Flowing pressure was 120 psi.

In the Big Mineral Creek area of Grayson County, the first well to find Pennsylvanan production was reported ready to complete as a pumping well from the 5,200-ft. sand. The well is George W. Humphrey 1 Barnes Heirs, William Allen Survey, which discovered the sand pay, then drilled ahead to test the Oil Creek, found at a much lower level than in wells to the northwest in the Sandusky area. A 24-hour test on the 1 Barnes tanked 81 bbl. of oil.

Meanwhile another test in the Big Mineral area was scheduled to drill ahead to the Oil Creek. Talbot Oil Co. 1 R. W. Hazlip, same survey, was at 6,728 ft. at last report.

In Wood County, W. D. Felder & Co. 1 W. L. Hulsey, H. Nelson Survey, was coring below 4,454 ft. and looking for the sub-Clarkesville. Contract depth was 7,000 ft.

Anco Gas Corp. of Dallas has filed application to drill its 1 M. E. Jackson Heirs as a 10,000-ft. test on a 127-acre lease in the Rionda Grant, 2½ miles southwest of Tennessee Colony in Anderson County.

A new exploration for Smith County has been scheduled by Magnolia Petroleum Co. as its 1 Vernon H. King. The 6,000-ft. operation is located on a 246-acre tract in J. H. Sanders Survey, 1½ miles northwest of Lindale.

Wisconsin Iron & Metal Co. of Milwaukee, Wis., has made location for a 7,500-ft. wildcat 6 miles west of Tyler, as the 1 E. H. Vaughn, in the George Myers Survey.

EAST TEXAS (DISTRICTS 5 AND 6) SUCCESSFUL WILDCAT

Rusk County: Clarke & Stone 1 Kangerga Bros., W. R. Moore Sur., 12 mi. SW Henderson, TD 3,825 ft., perforated Woodbine 3,815-25 ft., IP flowed 84.8 bbl. 35°-gravity oil, ¼-in. choke, TP 580 psi., GOR 3,671 cu. ft.

EAST TEXAS (DISTRICTS 5 AND 6) WILDCAT FAILURES

Falls County: O. R. Obermeyer 1 Warren Allen, R. McGary Sur., dry, TD 3,186

At this time of year when there

is considerable ringing of chimes

We hasten to send our best wishes for

a merry season and happy times

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Texas, Colorado, Missouri

New Mexico and all over the

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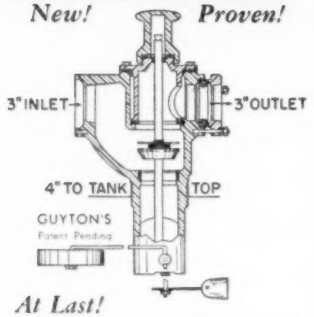

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ft., Buda 1,858 ft., George Town 1,960 ft., Edwards 2,135 ft.

E. O. Scherlen 1 Smithwick, J. Manchaca Sur., dry, TD 1,463 ft., Buda 1,136 ft., Georgetown 1,238 ft., Edwards 1,416 ft.

Mississippi

Smackover Gasser Finaled on West Side of Tinsley Field

JACKSON. — Union Producing Co.-Jones-O'Brien have completed their Smackover wildcat test on the west side of Tinsley field, Yazoo County, for a shut-in, low-volume, high-pressure, sour-gas well. Completion was made in third side-tracked hole which is open from window in casing at 13,985 ft. to total depth of 14,427 ft. in Smackover. The well flowed at the rate of 2,439,000 cu. ft. of sour gas plus 68 bbl. of 55.8° -gravity condensate per day through 7/16-in. choke. At the present, shut-in tubing pressure is 6,200 psi., and casing pressure 1,700 psi.

In Choctaw County, which is considered the "hard rock" area of the state, Henson-Rife Co. 1 W. J. & T. W. Green, 10-17n-9e, is drilling ahead at 4,565 ft. While operator was drilling in the Pottsville (Pennsylvanian), some hydrocarbons which closely resemble dark-colored fuel oil appeared on the pits. Electric log was run to 4,517 ft. with top of Pottsville being picked at 4,274 ft. There was no evidence of any permeable section below top of Pottsville.

Lion Oil Co. 2 Denkmann, Smackover wildcat in 22-7n-4e, Rankin County, encountered a show of gas in drilling fluid while drilling at 15,100 ft. Operator cut core at 15,102-17 ft., and slight show of gas was noted. The well was drilled ahead, and some trouble was encountered with the well trying to kick after a trip had been made. At total depth of 15,140 ft., circulation was lost, and operator pulled drill pipe to the bottom of the surface pipe at 6,509 ft. At last report, the hole had quit taking mud and pipe was run back into the hole in easy stages. At present, drill pipe has been run to 10,400 ft. after stopping to circulate every thousand feet.

First Sparta sand production has been opened in Adams County at Austin E. Stewart et al, 1 F. M. McGehee, 41-8n-1w, approximately 3 miles northeast of Washington. From perforations at 3,001-03 ft., the well had a calculated open flow potential of 20,000,000 cu. ft. of dry gas daily.

Five oil sands with 43 ft. of effective pay have been logged in Barnett Serio Drilling Co. and Gulmon & Jones 1 Ligon & Mazique, 20-5n-3w, on the northwest flank of Sibley field in Adams County. Tests are expected to get under way immediately.

MISSISSIPPI SUCCESSFUL WILDCATS

Jefferson County: Magnolia Petroleum Co. 1 Noland Estate, 10-9n-1e, TD 3,909 ft., Wilcox 3,856-64 ft., IP: 82 bbl. oil per day, 10/64-in. choke, 28° gravity, TP 140 psi., CP 500 psi.

Yazoo County: New pay at Tinsley—Union Producing Co.-Jones-O'Brien 1 Logan, 23-10n-3w, TD 14,427 ft., Smackover 13,985-14,427 ft., IP: 68 bbl. 55.8° gravity condensate and 2,439,000 cu. ft. of gas daily, 7/16-in. choke, well is shut in.

MISSISSIPPI WILDCAT FAILURES

Adams County: Dave Gammil-L. Cashion Co. 1 Roger G. Davis, 29-6n-3w, dry, TD 6,252 ft.

Gulmon & Johns-J. S. Callon 1 R. L. Emery, Jr., 45-6n-2w, dry, TD 6,508 ft.

Jefferson County: A. Stewart-Lincoln Drilling Co.-R. H. Alagood 1 Wilma C. Berry et al, 53-9n-1e, dry, TD 6,507 ft.

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North Central Texas

Canyon Sand Discovery Completed in Nolan County

WICHITA FALLS.—Union Oil Co. of California 1 TXL, Canyon sand discovery northeast of Maryneal in Nolan County, completed this week as a flowing well. Twenty-four hour potential was better than 118 bbl. of 42°-gravity oil, through ¼-in. choke from perforations at 5,158-70 ft., 5,174-82 ft., and 5,208-38 ft. Nearest Canyon production is in Lake Trammell field some 2½ miles north.

A new pay in the Upshaw-Caddo field northeast of Aspermont has been added by Seaboard Oil Co. 1 T. A. Upshaw, 61-D-H&TC. Completion was made from open hole at 4,757-4,824 ft., and daily potential was 175 bbl. of oil a day through ¼-in. choke. Regular pay for the field is around 5,900 ft.

In Jack County, final test was reported at Tom C. Patten Production Co. 1 J. R. Williams, 8 miles southwest of Jacksboro. The Strawn sand discovery flowed 350 bbl. of oil a day through 13/64-in. choke from pay at 4,475-98 ft.

Elsewhere in Stonewall County, W. F. Nenney 1 O. M. Sparks, 14 miles southwest of Aspermont, developed a flow of 126 bbl. of oil in 10½ hours through 18/64-in. choke. Pay section was a reef section around 5,250 ft.

West of Peacock, Continental Oil Co. 1 C. Nichols was drilling shale at 6,100 ft.

Sun Oil Co. staked location for a 7,000-ft. wildcat in Nolan County as the 5 Beatrice K. Stone in 96-X-T&P. Location is ½ mile southwest of their 2 Stone, dry hole, and some 11 miles southwest of Sweetwater.

In Clay County, Bay Petroleum Co. 2 Neville Estate, Block 65, Gravis Subdivision of the Orange CSL Survey, developed 270 ft. of oil and 30 ft. of oil-cut mud on a 2-hour test at 6,023-40 ft. The section was not identified. Operators were waiting on cement after setting pipe at 6,012 ft.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) SUCCESSFUL WILDCATS

Coleman County: Horace E. White 1 R. W. Hosch, Sec. 25, H. Crocheron Sur., TD 1,548 ft., IP 10,500,000 cu. ft. of gas, CP 625 psi.

Horace E. White 3 Hosch, Sec. 25, H. Crocheron Sur., TD 1,538 ft., IP 21,000,000 cu. ft. of gas, CP 640 psi.

Jack County: The Texas Co. 1 Arch Hicks, L. H. Pruitt Sur., TD 6,878 ft., perforated 6,750-70 ft., IP pumped 10 bbl. oil.

Jones County: Belcher Green 1 S. W. Hughes, Blk. 2, W. T. Scott Sur., TD 1,578 ft., pay 1,576 ft., IP pumped 20 bbl. oil in 6 hr., GOR 322 cu. ft.

Stephens County: The Texas Co. 1 A. J. Jones, 13-8-T&P, TD 4,614 ft., PB 3,490 ft., Caddo 3,314 ft., IP 1,120,000 cu. ft. gas.

Warren Oil Corp. 1 A. P. Fambrough, 15-6-T&P, TD 3,685 ft., IP 61 bbl. oil, 20/64-in. choke, TP 50 psi., GOR 354 cu. ft.

Wilbarger County: Baker Properties 1 Tharp Lease, 8-5-H&TC, TD 1,950 ft., pay 1,910 ft., IP pumped 25 bbl. 37°-gravity oil.

Young County: Turner & West 1 Mattie Cunningham, Sec. 1,912, TE&L Sur., TD 3,718 ft., perforated 3,484-94 ft., IP 101 bbl. 43°-gravity oil, 16/64-in. choke, TP 325 psi., GOR 450 cu. ft.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) WILDCAT FAILURES

Archer County: Paul Bilbrey and Wayne Albritton 2 Mankins, SPRR, A-427, dry, TD 724 ft.

Bridwell Oil Co. 1 Myrtle Henderson, 47-3-Clark & Plumb, dry, TD 4,624 ft.

Harry F. Snebold 1 H. Wilmut, G. N. Smith Sur., dry, TD 1,785 ft.

Clay County: Consolidated Oil Co. 1-C Avis

No. 3 of a Series

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Estate, Blk. 13, Rains CSL, dry, TD 4,500 ft.

Coleman County: J. H. Blackwell 2 L. S. West, Sec. 701, J. H. Barkley Sur., dry, TD 2,205 ft.

Comanche County: Progress Petroleum Co. 1 Fritz Speck, T. J. McCarty Sur., dry, TD 3,402 ft., elev. 1,956 ft., Strawn 3,092 ft.

Cooke County: T. P. Frost 3-B E. G. Ramsey, Sec. 569, B. Lusk Sur., dry, TD 1,490 ft.

Fisher County: General Crude Oil Co. 1 W. P. Bomar, Blk. 5, K. K. Rector Subd., Bastrop CSL, dry, TD 6,454 ft., elev. 1,901 ft., Caddo 6,220 ft., Ellenburger 6,420 ft.

Sun Oil Co. 1 Mrs. J. M. Hilburn, 179-3-H&TC, dry, TD 6,245 ft., elev. 2,115 ft., Strawn 6,060 ft.

Haskell County: Cities Service Oil Co. 85-1 Flat Top, Sec. 85, BBB&C Sur., dry, TD 5,950 ft., Mississippian 5,757 ft., Ellenburger 5,876 ft.

Standard Oil Co. of Texas 1 Mary Guinn, 10-2-H&TC, dry, TD 6,050 ft., elev. 1,633 ft., Canyon sand 4,890 ft., Caddo 5,600 ft., Mississippian 5,840 ft., Ellenburger 5,984 ft.

Frank Wood Associates 1 Marguerite Morgan, Sec. 4, C&M Sur., dry, TD 6,011 ft.

Youngblood & Foree 1 Elmer McKinney, Andrew Hamil Sur., dry, TD 5,740 ft.

Jones County: W. M. Jarrell 1-A W. T. Davis, 40-15-T&P, dry, TD 2,144 ft.

Woodley Petroleum Co. 1 Paul Gardner, 18-2-SPRR, dry, TD 4,692 ft., elev. 1,760 ft., Palo Pinto 4,153 ft., Stran sand 4,559 ft.

Montague County: T. B. Cochran 1 J. S. Dennis, F. Robertson Sur., dry, TD 2,209 ft.

Palo Pinto County: Palo Pinto Oil & Gas Corp. 7 Wm. Sanders, 43-2-T&P, dry, TD 4,458 ft.

Shackelford County: The Ohio Oil Co. 1 Merrick Davis, 17-12-T&P, dry, TD 1,900 ft.

J. H. Van Zandt 1 Roma Manley, 28-14-T&P, dry, TD 1,717 ft.

Stephens County: W. W. Wise 1 W. G. Cockerell, Sec. 1,440, TE&L Sur., dry, TD 2,365 ft.

T. W. Murray 1 J. E. Bynum, Sec. 18, LAL Sur., dry, TD 4,553 ft., elev. 1,801 ft., Capps 3,654 ft., Caddo 4,377 ft.

Paul P. Steed 1 J. O. Barrett, Wm. Bell Sur. 425, dry, TD 4,447 ft., elev. 1,904 ft., Gray 3,898 ft., Caddo 4,178 ft.

Stephens Petroleum Co. 1 E. L. Horton, 13-1S-T&P, dry, TD 3,617 ft., elev. 1,869 ft., Swastika 3,085 ft., reef 3,548 ft.

Wichita County: Kenneth Ellison 1 E. T. Thompson, L. Napoleon Sur., dry, TD 4,870 ft.

R. L. Underwood 1 G. B. Chapman, Sec. 12, Tarrant CSL, dry, TD 1,950 ft.

Wilbarger County: Frank Wood 1 D. Melton, 15-5-H&TC, dry, TD 4,618 ft.

Wise County: J. B. Bevier 1 Mrs. Gussie Kaker, Rebecca Coleman Sur., dry, TD 5,578 ft.

Young County: Turner & Duvall 1 Loftin J. F. Bussey Sur., dry, TD 3,749 ft.

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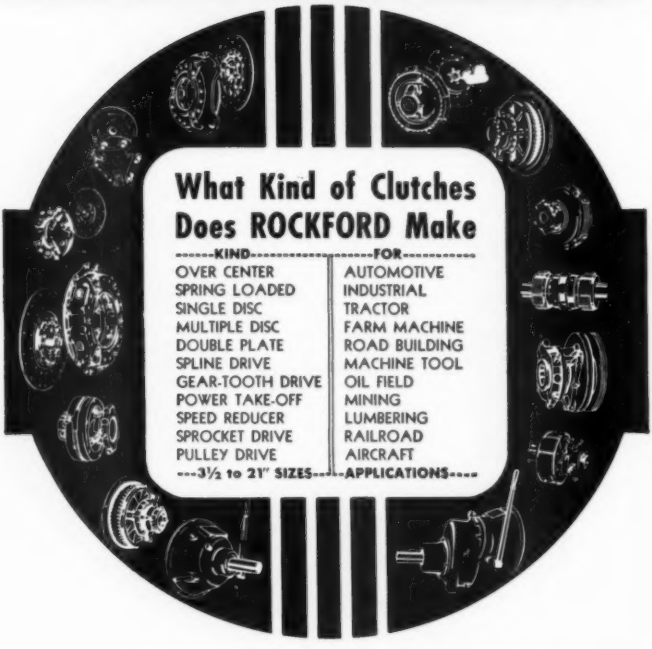

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ROCKFORD CLUTCHES

California

No Seasonal Letdown Seen In State Wildcating Efforts

LOS ANGELES.—California operators show no indication of slackening their wildcatting efforts as is usually the case at this time of the year. On the contrary, judging from the number of tests drilling and getting under way, it appears as if December will be the most active month of the year.

During the past week a total of 19 wildcats or extension attempts were either abandoned or suspended. Only one was successful, a deep-zone discovery in Ramona field of Ventura County. The fact this activity took place in 11 counties, from Riverside northward to Solano County in the Sacramento Valley, gives an indication of just how widespread the search is.

The Ramona discovery was Superior Oil Co. 14 Black, in 13-4n-18w on the east side of the field. Drilled to 7,925 ft., hole was plugged back to 7,795 ft. where the well was completed for about 300 bbl. daily through 117 ft. of perforations above that depth. The field's two regular pays, both in the Modello of upper Miocene, are found at about 2,700 and 4,100 ft.

Water difficulties continued to plague Bolsa Chica Oil Corp. 1 Kidson, a potential oil discovery ¾ mile east of the Playa Del Rey field in western Los Angeles. With 7-in. casing cemented at 7,416 ft., or about 47 ft. into a schist conglomerate, the wildcat made a good flow of 33°-gravity crude through perforations at 7,375-85 ft. Then salt water broke in. At the weekend the operator was attempting to plug off the bottom section of the hole.

At Tejon Ranch on the southeast end of San Joaquin Valley, Reserve Oil & Gas Co. completed its 58-33 "Well" as a new gas-zone discovery. Through perforations at 4,727-70 ft. and 4,783-4,857 ft., in the equivalent of the Valvulineria California zone, the well flowed at the rate of 3,000 M.c.f. daily on a ¼-in. bean. Location of the new pool opener is SW SE 33-11n-19w.

West of McKittrick production about 1 mile, E. A. Bender et al's recent Phacoides sand discovery was being reworked after producing about 2,500 bbl. of 33°-gravity crude. The discovery, 1 Anderson in SE NE 15-30s-21e, was made about a month ago in a 4,605-ft. sand. The liner was being pulled preparatory to plugging off the bottom portion of the hole.

Standard of California appeared on the verge of a deeper pay discovery in old Midway-Sunset area at its 69 M.J.M. & M. in 36-12n-24w. On a formation test at 3,132-3,270 ft., in the Pacifica section, there was a rise of 1,850 ft. of clean oil. The operator was to attempt to complete the well in both the Obispo and Pacifica fractured-shale zones, the latter so far untested on the lease.

In Cuyama Valley, Richfield Oil Corp. has apparently extended production in Government-18 sand one location southeast at Morales Canyon field. The extensioner, 23-11 Ritter C in 11-11n-28w, flowed at the rate of 720 bbl. daily on a 3-hour formation test at 5,355-5,492 ft. Highly faulted, the field has yielded as many dry holes as producers since its discovery more than a year ago.

At the valley's fifth and newest oil field, Central Cuyama, Richfield was preparing to start 87-22 Kirschenmann as a northwest offset to the discovery well in SE SE 10n-26w. Two previous attempts by Richfield to extend the 7,300-ft. middle Miocene sand were failures.

CALIFORNIA WILDCAT FAILURES

Contra Costa County, Martinez area: Lovely Pet. Co. 4 Almond, 31-2n-2w, dry, TD 4,610 ft., elev. 325 ft.

Kern County, Antelope Hills area: F. L. Williams 4 "Well," 1-28s-19e, dry, TD 3,930 ft., elev. 878 ft.

Bena area: Golden Dome Oil Co., Inc., 13-1 Tejon Ranch, 13-30s-30e, dry, TD 2,162 ft., elev. 994 ft.

Tejon Flat area: Tejon Exploration Co. 66-21 "Well," 21-11n-19w, dry, TD 1/2,750 ft., elev. unreported.

Tejon Hills area: Fairco Drlg. & Dev. Co. 2 Fairco, 10-11n-18w, dry, TD 606 ft., elev. 1,118 ft.

Kings County, Pyramid Hills area: Barnes Core Drlg. Co. 2 Lucier, 19-24s-18e, dry, TD 3,162 ft., elev. unreported.

Dohm Oil Co. 1 Fairco, 8-24s-18e, dry, TD 868 ft., elev. unreported.

Los Angeles County, Newhall - Townsite area: D. S. Fletcher 3 Betsy-Linda, dry, TD 770 ft., elev. 1,374 ft.

Newhall-Tunnel area: Union Oil Co. 1 Brazos - Needham, 13-3n-16w, dry, TD 4,008 ft., elev. 1,775 ft.

Monterey County, San Ardo area: Standard Oil Co. B6-5 Alexander, 5-23s-11e, dry, TD 3,050 ft., elev. 1,096 ft.

Riverside County, Corona area: Ciroco 1 Ciroco-Wright, 33-3s-7w, dry, TD 1,516 ft., elev. 827 ft.

San Joaquin County, Tracy area: Seaboard Oil Co. 1 Hall, 6-2s-5e, dry, bottomed in Cretaceous, TD 5,865 ft. ,elev. 5 ft.

San Luis Obispo County, Cuyama Valley area: J. F. Kosanke 9 Kosanke, 23A-11n-28w, dry, TD 4,306 ft., elev. 1,020 ft.

Barrett Creek area: The Texas Co. 1 Santa Margarita, 5-32s-19e, dry, TD 2,875 ft., elev. 2,589 ft.

Santa Barbara County, Santa Ynez area: British American-Ohio Oil Co. 3 Santa Ynez Unit, 6-5n-29w, dry, TD 4,002 ft., elev. 1,750 ft.

Solano County, Isleton area: The Texas Co. 3 Ryer Island Comm., 14-5n-3e, dry, TD 4,622 ft., elev. 10 ft.

Ventura County, Coyote Creek area: Sunray Oil Corp. 1 Dunshee One, 26-4n-24w, dry, TD 7,160 ft., elev. 900 ft.

Simi area: Union Oil Co. 16 Simi, 11-3n-18w, dry, TD 1,500 ft., elev. 2,725 ft.

CALIFORNIA SUCCESSFUL WILDCAT

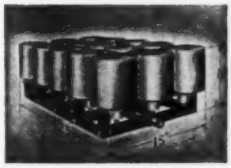
Ventura County: New deep-zone discovery in Ramona field—Superior Oil Co. 14 Black, NE SE 13-4n-18w, IP flowed 300 bbl. 20°-gravity crude, 18.5 per cent cut, perf. 7,678-7,795 ft., TD 7,925 ft., elev. 1,542 ft.

South Louisiana

Terrebonne Parish Discovery Finaled for 206 Bbl. Daily

NEW ORLEANS. — Final completion has been made on Humble Oil & Refining Co. 1 L. L. & E. "D," 32-19s-20e, Terrebonne Parish oil discovery. The well is credited with 206 bbl. of 34.6°-gravity oil daily from perforations at 13,231-34 ft. Gage was made through 1/8-in. choke under tubing pressure

Let Your Gas Burner



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Incorporated

November 23, 1951.

of 4,650 psi. This new pool is located approximately 5½ miles southeast of Houma gas field and 5 miles east of Baptiste field. Hole is bottomed at 13,678 ft. with 7-in. casing cemented at 12,159 ft. and 5-in. liner set from 11,670-13,678 ft. On electric log, this well had an indicated oil sand at 11,458-68 ft., gas sand at 12,159-80 ft., and another oil sand at 12,811-45 ft.

Sohio Petroleum Co. is preparing to perforate and test its St. Landry Parish wildcat, 1 Thistlewaite Lumber Co., 64-4s-4e. Operator squeezed off perforations at 11,660-68 ft. after testing no shows. The new interval to be perforated is at 11,656-66 ft. Hole is bottomed at 12,505 ft. with 5½-in. casing cemented at 11,778 ft.

In the same parish, Sun Oil Co. is drilling below 10,138 ft. at 1 Higginbotham Unit 1, wildcat in 38-7s-5e, after running electric log to 10,019 ft. This venture was originally scheduled to go to 10,000 ft.

Testing operations are scheduled to get under way at Kerr-McGee Oil Industries, Inc., 1 Continental Land & Fur Co., wildcat in 55-17s-15e, Terrebonne Parish. Operators have set cement plug at 11,780 ft., preparatory to testing. Hole is bottomed at 13,025 ft. with 7-in. casing cemented at 11,477 ft.

Hunt Oil Co. has staked location for a 10,500-ft. wildcat in Rapides Parish. Venture is B. E. Smith Estate, 16-1n-2w, approximately 2½ miles northwest of Forest Hill.

Shell Oil Co. has abandoned 1 Shell-Helis State Lease 1762 Delacroix Unit, wildcat in 7-16s-16e, Plaquemines Parish. The well was drilled to 10,500 ft., and electric logs run at several intervals with no shows.

SOUTH LOUISIANA WILDCAT FAILURE

Cameron Parish: Kemp Drilling Co. et al 1 J. H. Woods, 13-15s-6w, dry, TD 8,515 ft.

Appalachian-Ohio

New Well Started In Portland District

PITTSBURGH.—In the Portland district of Preston County, West Virginia, Hope Natural Gas Co. has started drilling operations at 9694 Leonie Burrows, elevation 2,061 ft. Location is in Kingwood Quadrangle, .05 mile south of Lat. 39° 25′ and 4.2 miles west of Long. 79° 30′. Well is now drilling below 514 ft.

Hope 9665 J. Paul Martin, elevation 2,308 ft., topped the chert at 5,223 ft. and is running 7-in. casing at 5,225 ft.

Hope 9673 Nina Kay is drilling below 4,552 ft., and 9676 Sarah J. Creamer is drilling below 2,065 ft.

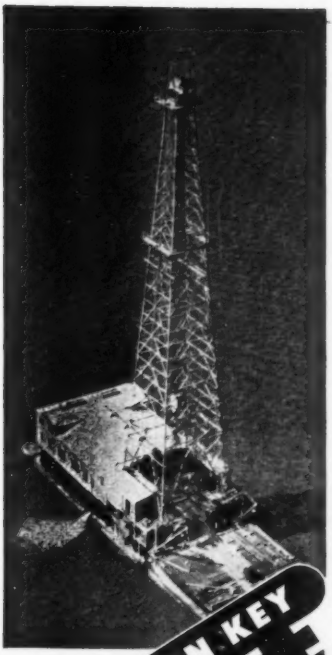
Manufacturers Light & Heat Co. 4116 Enzer and Annie E. Whitehair is drilling below 3,750 ft.

In Clover district, Tucker County, Hope Natural Gas Co. 9691 Lee Spessert is drilling below 2,514 ft. In Gore district, Hampshire County, T. M. Petigrew et al 1 John Timbrook, elevation 1,198 ft., is drilling below 5,272 ft.

In Lincoln district, Wayne County, Owens, Libbey-Owens 62-842 Wilson Coal Land Co. resulted in 2,299,000 cu. ft. gas. Total depth of this well is 1,584 ft.

Center district, Gilmer County, Hope Natural Gas Co. 9687 Louis Bennett gaged 1,441,000 cu. ft. gas from the Big Injun sand, total depth of well 2,245 ft.

Maryland.—Garrett County: Blaho Oil & Gas Co. completed 1 Dorcie Rumer gaging 325,000 cu. ft. gas. Onondaga 3,799 ft., chert 3,810 ft., gas 3,842-3,860 ft., Oriskany sand 3,940 ft., gas 3,944 ft., total depth 4,051 ft.; New York State Natural Gas Corp. 1-N-230 C. P. Martin resulted in a dry hole, Tully 2,983-2,990 ft., Oondaga 3,502 ft., chert 3,532 ft., Oriskany sand 3,665 ft., total depth 4,089 ft.; 1-N-240 John K. Shaw, elevation 2,455 ft., Onondaga 3,668 ft., is casing at 3,673 ft.; Mid Atlantic Oil & Gas Co. 1 Odd Fellows, elevation 2,424 ft., Oriskany sand 3,842 ft., had a show of gas testing 34,000



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cu. ft. at 3,859 and 3,885 ft. and is now drilling below 3,941 ft.; Clarksburg Gas Co. 1 T. W. Ashby, elevation 2,391 ft., is drilling at 3,667 ft., Oriskany sand 3,640 ft., gas 3,661-3,664 ft., 36,000 cu. ft.

Southeast Pennsylvania.—South Buffalo Township, Armstrong County: Pittsburgh Plate Glass Co. 2-839 Mary A. McGinley, elevation 1,153 ft., is cementing in fishing operations at 6,694 ft., depth of hole 6,936 ft. Unity Township, Westmoreland County, Peoples Natural Gas Co. 1-4003 A. J. Dotterway, elevation 2,094 ft., is drilling below 3,350 ft.

MARYLAND SUCCESSFUL WILDCAT

Garrett County: Blaho Oil & Gas Co. 1 Dorcie Rumer, 325,000 cu. ft. gas, Onondaga 3,799 ft., chert 3,810 ft., gas 3,842-3,860 ft., Oriskany sand 3,940 ft., gas 3,944 ft., TD 4,051 ft.

MARYLAND WILDCAT FAILURE

Garrett County: New York State Natural Gas Corp. 1-N-230 C. P. Martin, dry, Tully 2,983-90 ft., Onondaga 3,502 ft., chert 3,532 ft., Oriskany sand 3,665 ft., TD 4,089 ft.

OHIO

Fierbaugh and Ringler have opened another small gas pool in Richland County. The 1 Ira George, Section 36, Jefferson Township, found Clinton sand at 2,382-84 ft. with an open flow of 110,000 cu. ft. natural. The gasser was shot and was shut in at 250,000 cu. ft. with 1,300 psi. pressure.

In Berea sand field in Ashland County, Harry McClellan 9 Paul Funk, Section 26, Perry Township, reported sand at 516-678 ft. with a good showing of oil natural that increased to 40 bbl. in 24 hours after shot.

The Ohio Fuel have two wildcats running in Medina County, the 1 William J. Ollard, Lot 22, Granger Township, and the 1 George Surrarrer, Lot 29, Litchfield Township. Clyde Foraker et al. have started drilling their step-out on 1 F. R. Morrison, Section 22, Franklin Township, Licking County.

Rocky Mountain

Production Declines at Richey Area Discovery

DENVER.—Shell Oil Co. is continuing tests at the Richey area, Dawson County, discovery well in northeastern Montana, with the well now dropping on production and water percentage increasing.

Shell's well is 1 NPRR, SE NW NW 19-23n-56e. The well flowed 1,656 bbl. of 38°-gravity oil daily last week through open tubing. Shell has continued tests with the well now flowing 250 bbl. of fluid, 50 bbl. of which is salt water, through 12/64-in. choke, in 22 hours.

The company has announced location for a new wildcat at 22-25-B-NPRR, E½ SE NW 25-22n-48e, 6 miles southwest of the discovery in McCone County. Shell is also testing the Pine unit wildcat, 60 miles southeast of Richey, with that well flowing and swabbing 5 bbl. of oil per hour from the Ordovician. The Richey area production is from Charles (upper Mississippian).

Also continuing the eastern Montana exploratory program, but outside the Williston basin, Shell has announced location for a wildcat in the Lame Deer area, SW SW NE 13-2s-42e, in Rosebud County, on the north side of the Powder River basin.

On the North Dakota side of the Williston basin Amerada Petroleum Corp. is now testing Madison in 1 Iverson, C SW SW 6-155n-95w, Williams County, the first well to find production in this basin. The well was completed in June this year as a commercial producer in the Devonian below 10,000 ft. after going to 11,955 ft. and plugging back. Amerada has now plugged

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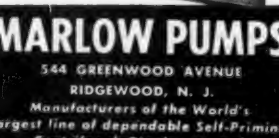

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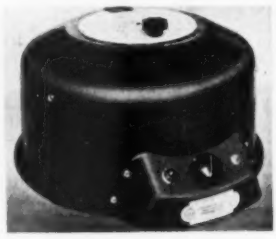

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the well back to 8,560 ft. and has perforated opposite basal Madison, at 8,456-8,543 ft. The well made 3,724 ft. of oil and gas-cut mud with some sulfur water on test of this basal zone and the operator is continuing tests.

Attention is also focused on The California Co.'s wildcat at 1 Thompson, SW SW SE 31-160n-81w, 75 miles east of the Nesson anticline and in Bottineau County. This well is coring below 6,325 ft. with no information released as to tops nor tests by the operator. Unofficial top of Spearfish is reported at 3,481 ft. and at the present depth the well is believed to be in Mississippian or Ordovician. Additional leasing has been reported through this general area of the basin. California is coring the entire lower section of the well, and will release data on the wildcat when operations are completed.

Sinclair Oil & Gas Co. has announced completion data on their East Salt Creek, Wyoming discovery, with the well a disappointment on tests. The well is located in the SE SW SW 10-40n-78w, and swabbed 203 bbl. of oil in 21 hours from the Lakota and flowed 48 bbl. in 24 hours from second Wall Creek. Initial drill-stem tests of the second Wall Creek had indicated a much better producer and Sinclair had some difficulty in completing the well. However, the discovery is rated of importance, 5 miles east of Salt Creek field which has produced more than 300,000,000 bbl. of oil from the Wall Creek sands. Sinclair and others are making locations for additional drilling in the new pool.

Stanolind Oil & Gas Co. and Continental Oil Co. are drilling ahead for a test of Madison at the new North Fork, Wyoming, discovery, C SW SW 19-44n-81w, Johnson County. This wildcat found saturation through more than 225 ft. of Tensleep sand and had oil recovery on tests of the complete zone. The wildcat is northwest of Sussex-Meadow Creek pools, where a Tensleep discovery was completed by Continental earlier this year.

Wildcat drilling is continuing at a rapid pace through the Denver-Julesburg basin of Colorado and western Nebraska, with six new locations this week. Shamrock Oil & Gas Co. made location for their first drilling in this basin with the well at 1 Drier, NW NW NW 27-7n-50w, Logan County, Colorado. E. K. Carey Drilling Co., Skelly Oil Co., Sohio Petroleum Co., Ohio Oil Co., and Deep Rock Oil Co., were among those announcing new locations for the week.

COLORADO WILDCAT FAILURES

Loveland, Larimer County: Booth & Hays 1 Coffin, C SE SE 25-5n-69w, TD 1,456 ft., dry, Hygiene sand 1,421 ft.

Iliff, Logan County: Amerada Petroleum Corp. 1 Mittlestadt, NW SE SW 14-9n-52w, TD 5,205 ft., dry, Niobrara 3,754 ft., Timpas 4,020 ft., Greenhorn 4,270 ft., Greasewood 4,577 ft., Mowry 4,716 ft., Cloverly 4,940 ft., Morrison 5,154 ft.

West Plains: Shell Oil Co. 1 Peavy, SW SW NW 27-11n-55w, TD 6,953 ft., dry, Niobrara 5,782 ft., Timpas 6,015 ft., Codell 6,060 ft., Muddy 6,440 ft., Dakota 6,510 ft., Lakota 6,789 ft., Morrison 6,840 ft.

West Sterling: H. C. Arnold 1 Conrad Luft, NW NW SE 30-8n-52w, TD 4,665 ft., dry, Niobrara 3,558 ft., Timpas 3,901 ft., Carlile 3,962 ft., Greenhorn 4,158 ft., Graneros 4,168 ft., "D" sand 4,398 ft., "J" sand 4,499 ft.

Wildcat, Yuma County: Brown Drilling Co. 1 Pyle, NE NE NW 21-4n-45w, TD 6,137 ft., dry, Niobrara 2,577 ft., Fort Hays 2,901 ft., Greenhorn 3,140 ft., first sand 3,343 ft., Cloverly 3,648 ft., Morrison 3,850 ft., Cimarron 3,999 ft., Big Blue 4,528 ft., Topeka 5,048 ft., Lansing 5,224 ft., Marmaton 5,460 ft.

WESTERN NEBRASKA WILDCAT FAILURES

Northwest Peetz, Cheyenne County: Julian Davis 1 Nelson, NE NE SW 8-12n-52w, TD 5,375 ft., dry, Niobrara 4,381 ft., Carlile 4,765 ft., Greenhorn 4,970 ft., Muddy 5,205 ft., Dakota 5,320 ft.

Northwest Big Springs, Deuel County: Plains Exploration Co. and Dunn & Boreing 1 Vance, SE SE SE 15-14n-43w, TD 3,688 ft., dry, Niobrara 2,625 ft., Ft. Hays 3,012 ft., Carlile 3,055 ft., Greenhorn 3,226 ft., "D" sand 3,415 ft., "J" sand 3,536 ft., base "J" sand 3,624 ft.

Wildcat, Kimball County: S. D. Johnson 1 Hessner, S½ NW NW 35-14n-58w, TD 7,340 ft., dry, Niobrara 6,312 ft., Ft. Hays 6,510 ft., Codell 6,590 ft., Carlile 6,596 ft., Greenhorn 6,909 ft., "D" sand 7,119 ft., "J" sand 7,238 ft.

Central Area

MICHIGAN

Brazos Oil & Gas Co. was testing a potential Salina pay section after acid treatment with 1,500 gal. at the company's HE-1 State-Chester, C NE NE 15-29n-2e, Chester Township wildcat, Otsego County. This may be the most important wildcat now being tested in Michigan for the year.

This test, which was scheduled to penetrate the Niagaran, logged this zone at about 6,680-90 ft., but most encouraging shows were found in a dolomite zone in the Salina section just above the Niagaran. Hole was bottomed out in the Niagaran at 6,712 ft. and was plugged back to 6,638 ft. A long string of 5-in. casing was set and cemented at 6,606 ft. The best looking dolomite zone in the Salina was logged from 6,610 to about 6,625 ft. Core of this section showed fractures, vugs, and good odors of oil.

A 1,500-gal. clean-out acid shot was spotted at 6,612-25 ft. Hole was loaded with salt water and flushed with salt water on this acid treatment. Some oil and gas was showing and spraying from the hole while swabbing was in progress and before all of the acidizing fluids had been recovered. There are several other zones in the same section behind the casing which will probably be perforated and tested. The present horizon under test will be reacidized.

This Salina section is comparable with the gas pay zone being produced in Howell gas pool, Livingston County, and is believed to be generally comparable to the Salina gas pay found in Gulf Refining Co. 1 Bateson, deep test in Kawkawlin pool, Bay County. The Brazos wildcat is focusing serious attention on northern Michigan. It was drilled following the completion of a core-drill program. If a Salina gas and oil pool is developed in Otsego County it will kick the lid off for new and deeper drilling in Michigan.

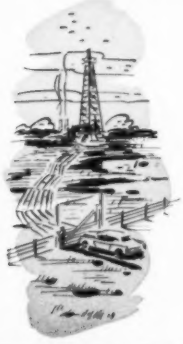
LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that the E½SE¼ sec. 15, T. 17 S., R. 32 E., N.M.P.M., New Mexico, 80 acres, within the known geologic structure of the Maljamar field, will be offered for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre at 1 p.m., Eastern Standard Time, January 2, 1952, when bids will be opened. The details of the lease offering and how and where to file bids may be obtained by addressing an inquiry to the Manager of the Land and Survey Office, Santa Fe, New Mexico, or to this office. Marion Clawson, Director.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that 319.69 acres in T. 46 N., R. 98 W., 6th P.M., Wyoming, within the known geologic structure of the Grass Creek field will be offered in three parcels for oil and gas leasing, through competitive bidding to the qualified bidder of the highest cash amount per acre, at 1 p.m., Eastern Standard time, January 2, 1952, when bids will be opened. The details of the lease offering, how and where to file bids, and a description of the lands may be obtained by addressing an inquiry to the Manager of the Land and Survey Office, Cheyenne, Wyoming, or to this office. Marion Clawson, Director.

The Drilling Contractor's Superintendent



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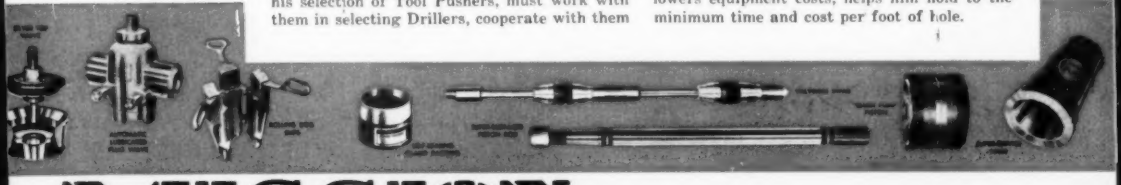

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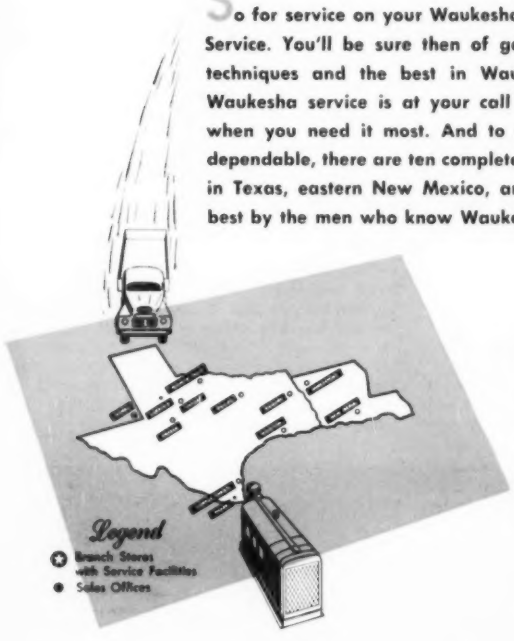

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ILLINOIS

Calvert Drilling, Inc., and associates have proved a new producing area east of the Dundas Consolidated pool in Richland County. Their 1 Walter Pictor, SE NW SW 28-5n-10e, produced at the rate of 190 bbl. of oil per day natural during swabbing tests of saturation in McClosky lime, and now is being put on the pump for completion. Pay is open through casing perforations at 2,873-81 ft. The area is just west of the village of Dundas, 8 miles north of Olney, and is about a mile east of production.

Completions during the week included a new oil discovery well 7 miles northwest of Albion, in Edwards County. It was Peak Drilling Co. 1 Ernest King, SW SE SW 27-1n-10e, which pumped 200 bbl. of oil daily from O'Hara lime at 3,266-72 ft. Production followed a 3,000-gal. acid treatment of the pay zone. The area is 2 miles southeast of production in the Maple Grove pool.

George & Wrather are completing their second well in the new area 3 miles northeast of Carmi, in White County. This well, 2 Reuben Winter, NE SW NW 32-4s-10e, a location diagonally southeast of No. 1, the discovery well, swabbed at an average rate of 15 bbl. per hour during initial tests. Its pay zone is in Aux Vases sand at 3,022-38 ft. The discovery well produces from O'Hara lime at 3,118-25 ft.

INDIANA

Production of the Union pool, in Gibson County, is being widened substantially to the west where Kirk Holland is completing a good well at his 1 Pauley, in Military Donation 109-1s-10w. The well flowed initially at an estimated rate of 30 bbl. of oil per hour from McClosky lime at 1,700-21 ft. (total depth). The area is 2½ miles west of Union.

WESTERN KENTUCKY

Placed on the pump for completion, George A. Hoffman and Basin Drilling Co. 1 Combes-Ashby, rank wildcat oil-discovery well in the NE NW SW 14-L-26, northeastern Hopkins County, produced 406 bbl. of oil in the first 18½ hours. Prior to going on the pump, it flowed 875 bbl. on an 8-hour test. Its pay zone is Aux Vases lime, opposite which casing is perforated at 2,631-39 ft.

Pumping tests also are under way at LaFitte Co.'s new Tar Springs sand discovery, 2,200 ft. south of the Hoffman well, in the same section, at 2 LaFitte fee (minerals). Pay zone is at 2,053-64 ft. The well is estimated good for 45 bbl. per day.

Smith's Mill North is the name of the new pool opened by Joe Reznik at his 1 Dorsey, in the NE NE NW 18-Q-21, northwestern Henderson County. The discovery well, located about a mile from production in the main Smith Mills pool, pumped 18 bbl. of oil per day from McClosky lime, in which casing is perforated at 2,629-34 ft. and 2,647-56 ft.

MICHIGAN WILDCAT FAILURES

Allegan County, Ganges Township: Ford Oil Co. 1 Hamlin-Wright-Newman Comm., SE NE NE 29-2n-16w, Traverse 1,247 ft., dry, TD 1,258 ft.

Martin Township: James J. McGerry, Trustee, 1 Mauchmar, NW NE SW 2-2n-11w, Traverse 1,760 ft., dry, TD 1,768 ft.

Bay County, Gibson Township: J. O. Mutch, Voorhees Drilling Co. and Floyd Umphrey 1 Umphrey and McLincha, SW SE NE 19-18n-3e, Dundee 3,055 ft., dry, TD 3,262 ft.

ILLINOIS SUCCESSFUL WILDCATS

Edwards County: Peak Drilling Co. 1 King, SW SE SW 27-1n-10e, IP 200 bbl., O'Hara 3,266-72 ft., TD 3,310 ft. (opens new pool).

Saline County: Illinois Mid-Continent Co. et al 1 Garner, NE SW SE 36-7s-7e, IP 36 bbl., Cypress 2,608-26 ft., TD 2,865 ft.

Washington County: Dale Hopkins 1 Waldo Finke, SW NE NE 34-2s-2w, IP 1 bbl., Benoist 1,430-39 ft., TD 1,442 ft. (opens new pool).

White County: W. C. McBride 1 Truscott, SE NE SW 28-5s-14w, IP 14 bbl., Cypress 2,268-78 ft., TD 3,123 ft. (opens new pool).

ILLINOIS WILDCAT FAILURES

Bond County: H. Luttrell et al 1 Buckmiller, SE SE NE 36-5n-3w, dry, TD 2,440 ft.

Clay County: Carter Oil Co. 1 Mitchell-Herdes, SW NW NE 3-3n-8e, dry, TD 3,149 ft.

E. F. Moran 1 Moore, NW NW NE 28-4n-5e, dry, TD 3,094 ft.

Calvert Drilling, Inc., 1 Iffert-Reed, SE SE NE 3-4n-8e, dry, TD 3,094 ft.

Edwards County: Miami Operating Co. 1 Mercer-Shaw, SE NE SW 7-1s-14w, dry, TD 3,250 ft.

Ashland Oil & Refining Co. et al 1 Briggs unit, NW NE SW 29-1s-14w, dry, TD 3,225 ft.

Fayette County: T. S. Doran 1 Raffel, SW SW SE 23-8n-1e, dry, TD 1,979 ft.

Gallatin County: Arnold Valter 1 Lemons, SE NE SE 18-8s-9e, dry, TD 2,748 ft.

Barron Kidd 1 Rider, NE NW SW 35-8s-9e, dry, TD 2,793 ft.

Wasson & Co. 1 Turns, SE NW NW 20-9s-8e, dry, TD 2,585 ft.

Hamilton County: Q. B. Mitchell 1 Barnett, SE NE NW 8-7s-6e, dry, TD 3,480 ft.

Jasper County: C. B. Mansfield 1 Brown, SW NW NW 5-5n-9e, dry, TD 3,190 ft.

Madison County: H. F. Robison 1 Best, SW SE NW 11-3n-7w, dry, TD 2,303 ft.

Dale Hopkins 1 Winet, SW SE SE 29-4n-5w, dry, TD 2,764 ft.

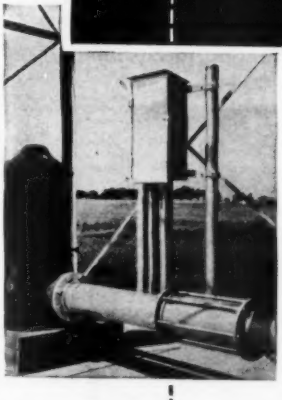
Shelby County: D. B. Lesh Drilling Co. 1 McClure, NW NE NE 8-12n-2e, dry, TD 2,810 ft.

Washington County: Ervin-Bassett Drilling Co. 1 Nottmeyer, SE SE SE 24-1s-1w, dry, TD 1,153 ft.

Columbus Exploration Co. 1 Wolff, SW SE NW 17-2s-4w, dry, TD 2,437 ft.

Wayne County: K & H Drilling Co. 1 Turner, NE NE NE 1-1n-5e, dry, TD 3,103 ft.

White County: D. H. Bolin 1 Bass, SW NW SE 28-5s-8e, dry, TD 3,492 ft.



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INDIANA WILDCAT FAILURES

Clark County: B. Stoll 1 Waters, S½ NW NE SW 7-1n-9e, dry, TD 1,400 ft.

Gibson County: Skiles Oil Corp. 1 Blood, NW NW NW 14-3s-13w, dry, TD 2,048 ft.

Knox County: Haynes Drilling Co. and Big Four Oil & Gas Co. 1 Kimmel, Survey 42-2n-10w, dry, 1,852 ft.

Lawrence County: Regional Development Co. 1 Lewis, NE NE SE 34-4n-2w, dry, TD 2,555 ft.

Spencer County: Oil Management, Inc., 1 Luckagi, SW NE SW 8-8s-6w, dry, TD 1,060 ft.

Sullivan County: Pure Oil Co. 1 Wellwood Shepard, NE SW NE 2-8n-8w, dry, TD 2,179 ft.

F. B. Cline 1 Anderson, SE SE NE 3-8n-9w, dry, TD 1,421 ft.

F. B. Cline 1 Patton, SW NE SW 36-8n-11w, dry, TD 855 ft. (stratigraphic test).

Pure Oil Co. 1 Granville Gentry, NW SE NE 2-8n-8w, dry, TD 113 ft.

Vigo County: F. A. Bridge 1 Ennen, NW SW SE 10-11n-9w, dry, TD 1,832 ft.

WESTERN KENTUCKY SUCCESSFUL WILDCATS

Henderson County: Joe Resnik 1 Dorsey, NE NE NW 18-Q-21, IP 18 bbl., McClosky 2,629-34 ft. and 2,647-56 ft., TD 2,744 ft. (discovery well Smith Mill North pool).

Tuley & Carter 1 V. A. Royster, WL SE SE NE 5-N-24, IP 115 bbl., Hardinsburg 1,992-2,010 ft., TD 2,010 ft. (discovery well Greenbrier South pool).

Logan County: G. G. Fisher 1 Chyle, C NW NW 8-F-34, IP 5 bbl., Devonian 1,304-35 ft., TD 1,475 ft. (discovery well Richelieu pool).

WESTERN KENTUCKY WILDCAT FAILURES

Henderson County: A. J. Slagter 1 Cates, NL SW NE SE 9-O-23, dry, TD 2,623 ft. Morris Drilling Co. 1 Woods, NEc NW SW NE 20-O-23, dry, TD 2,517 ft.

Muhlenberg County: G. E. Ellis 12 Brown, NW NW NW 15-H-32, dry, TD 360 ft.

Louisiana-Arkansas

Logansport Field Extended to Northeast

SHREVEPORT.—Skelly Oil Co. 1 Blunt has extended Logansport gas field to DeSoto Parish, Louisiana, and Shelby County, Texas, more than a mile to the north. This well has been completed for 12,000,000 cu. ft. of gas daily through perforations opposite the Paluxy between 2,870 and 3,058 ft.

Well is located 50 ft. south and east of the center of 9-12n-15w. It was drilled to a total depth of 6,707 ft. and plugged back to 3,454 ft. Casing was cemented at 3,255 ft. Flowing pressures were 925 psi. on the tubing and 1,320 psi. on the casing.

Arkansas.—In Union County in the south-central portion of the state, Marine Oil Co. 1 Pine, C NE SE 30-17s-12w, is an indicated Smackover lime oil discovery. From perforations at 6,046-60 ft. this New London area wildcat flowed at an estimated rate of 100-150 bbl. of heavy oil daily before being shut in for storage.

This apparent discovery was drilled to a total depth of 6,297 ft. After cementing pipe at 6,136 ft. the well was perforated and flowed to pits. The closest production is from the Nacatoch wells at the northern end of Sandy Bend field about 1½ miles south and west.

NORTH LOUISIANA WILDCAT FAILURES

Bienville Parish: Hunt Oil Co. 1 J. L. Lacy, 1,909 ft. S and 726 ft. E NWc of Sec. 9-14n-8w, dry, TD 3,543 ft.

Caddo Parish: Houston Oil Co. 1 Caddo, C NE SE 4-19n-15w, dry, TD 5,305 ft.

Concordia Parish: R. A. Campbell Co. et al 1 Sharp, from common corner of sections 15, 16, 17, and 20 go S 15° 30' E 2,580 ft. to location on SE line sections 16 and 17-4n-9e, dry, TD 7,510 ft.

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DeSoto Parish: Carter Oil Co. 1 A. M. Thigpen, C SW SW 32-15n-12w, dry, TD 3,011 ft.

Lazarov & Robilio 1 H. L. Franklin, 8,452 ft. S and 1,792 ft. E NWc of Sec. 6-11n-12w, dry, TD 2,743 ft.

Madison Parish: Gulf Refining Co. 1 E. C. Woodyear, 852 ft. S and 104 ft. W NEc of Sec. 35-16n-14e, dry, TD 2,600 ft.

Morehouse Parish: Carter Oil Co. 1 Hope fee, C SW NE 7-21n-9e, dry, TD 6,751 ft.

Red River Parish: H. L. Hunt 1 Nebo Oil "H," C N/2 NW SW 34-13n-6w, dry, TD 5,500 ft.

Canadian Fields

High Discovery Rate Recorded

CALGARY.—One of the highest rates of discovery for any 7-day period in the history of Alberta's petroleum industry was recorded during the past week, as that period brought discovery or indications of oil discovery at four wells in Alberta plus a natural-gas strike in the southern sector of the province.

Included in the oil strikes, all of which are in Central Alberta, are wildcats in the Drumheller, Skaro, and East Edmonton areas. A further venture, about 6½ miles south of Wizard Lake, entered D3 zone of Devonian, and showed encouragement that is favorable for oil discovery in that horizon. The gas discovery well is in the Hanna area.

Tests, to be carried out over the weekend or early next week, will likely determine the possibilities of commercial oil production at the new strikes made this week.

The Drumheller oil discovery was made by Highbury Syndicate, a group of eight Calgary independent oil firms formerly known as Rainbow Syndicate. This wildcat strike was made in the D2 zone of Devonian at a venture located around 70 miles northeast of Calgary, on a six-section farmout from Socony-Vacuum Exploration Co.

The discovery well, Alberta Pacific Consolidated Oils, Ltd.-Socony-Warner 1 Drumheller, is located in LSD 4, 10-29-18w4, 8½ miles east-southeast of previous Drumheller D2 oil production and 7½ miles southeast of the Naco 1 Drumheller gas discovery well. Drill-stem test at 5,406-44 ft. gave a moderate gas flow plus a recovery of 945 ft. of oil and 2 ft of slightly salty water. A later test from 5,446 ft. to bottom 5,465 ft. gave only water recovery. The well indicated about 20 ft. of D2 zone above water, with about 12 ft. of that being porous. Porosity was encountered at around 5,406 ft. String of production casing has been set to bottom of the well, and tests will likely commence early next week.

Northeast of Edmonton about 40 miles and 6 miles east of Redwater oil field, the team of Mid Conetinent Oil & Gas Co., Ltd., and Clear Petroleums, Ltd., discovered oil in the fragmental limestone. This discovery, Mid Continent-Clear 1 Skaro, in LSD 16, 29-57-19w4, was made below 3,600 ft. Two drill-stem tests, each 2 hours in duration, gave oil recoveries of 1,280 ft. and 1,800 ft., according to company engineers. Production string of casing has been set with further testing scheduled for next week. Mid Continent and Clear share this well 70-30, and have fairly substantial acreage holdings in the area

The East Edmonton strike was made in the basal quartz sand by Edmonton independent Chamberlain Oil & Gas, Ltd. This venture, Chamberlain 1, in LSD 10, 30-52-23w4, about 3 miles east of Edmonton, found a 28-ft. pay zone at 3,700-28 ft. During drill-stem test in that section crew recovered 1,300 ft. of light oil. Drilling was being continued at last report. Chamberlain Oil & Gas holds around 640 acres of lease rights in the vicinity of the discovery well.

The encouragement obtained at Texaco Exploration Co. 1-A Bonnie Glen, south of Wizard Lake oil field, warranted setting string of protective casing preliminary to actual test operations in D3 porous zone that has been encountered. Drilling was halted at 6,387 ft., a short distance into D3, and casing has been set. It is expected that plug will be drilled out over the weekend, and initial drill-stem testing will start early during the coming week. Site of this encouraging well is in LSD 3, 20-47-27w4, slightly over 6 miles south-southwest of Texaco-McColl's Wizard Lake oil producers.

This week's gas discovery was made by the team of Bay Petroleum Corp. and West Canadian Petroleums, Ltd., in the Hanna area. The well found its gas in the Viking sand and flowed at rate in excess of 3,000,000 cu. ft. daily during drill-stem test between 3,300 and 3,400 ft. The discovery well, Bay-Hanna 4-1, is in LSD 4, 1-31-16w4, about 87 miles northeast of Calgary, and 7 miles south-southwest of Hanna 1, gas discovery well. Drilling is being continued for lower objectives.

CANADIAN WILDCAT FAILURES

British Dominion 1 Stony Plain, LSD 16, 13-52-27w4, TD 6,038 ft.

Taber 1 Pinhorn, LSD 6, 29-1-10w4, TD 3,090 ft.

LEGAL

U.S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that two parcels of land in T. 19 N., R. 5 E., La. M., containing approximately 80 acres, within the known geologic structure of the Monroe field, Louisiana, will be offered for oil and gas leasing through competitive bidding to the qualified bidder of the highest cash amount per acre, at 1 p. m., Eastern Standard Time, on January 30, 1952, when bids will be opened. Details of the lease offering and how and where to file bids may be obtained by addressing an inquiry to this office. Marion Clawson, Director.

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Distributors: Diamond Drilling Co., 2759 E. Willow St., Long Beach, Calif., Telephone: Long Beach 40-7949; Allied Services, Inc., Mt. Pleasant, Michigan Telephone: 29-861

Foreign: D. T. O'Connor, 500 Fifth Avenue, New York, N. Y. Petroleum Industry Consultants, C. A., Caracas, Venez. Denton - Spencer Co., Ltd., Calgary, Alberta, Canada.

THE OIL AND GAS JOURNAL

"You been asking to marry his daughter, in smoke signals."

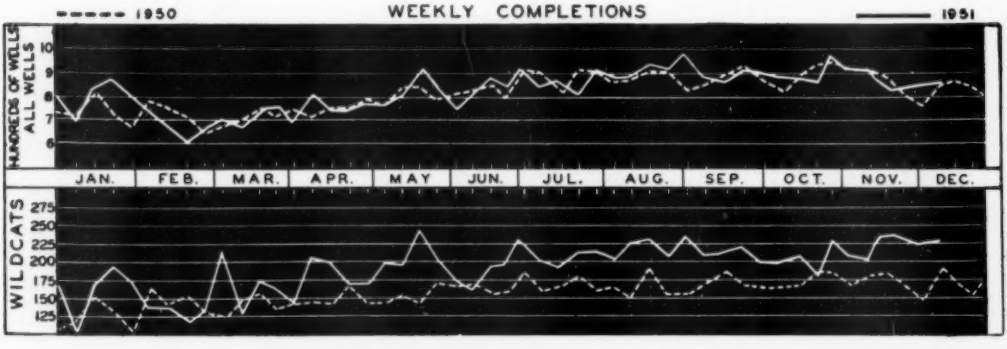
CURRENT STATISTICS

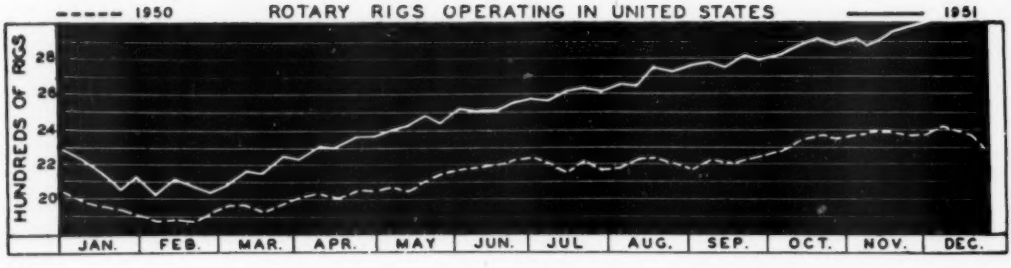
EXPLORATION

WEEKLY WELL COMPLETIONS . . . WEEK ENDED DECEMBER 8, 1951

	Total of all wells					Dec. 8		Wildcat completions and discoveries										
													Cumulative total, 1951					
	Comp.	Oil	Gas	Dry	Footage	1951	1950	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	12	6	0	*6	17,100	608	642	0	0	0	0	0	0	0	0	0	0
Pennsylvania	38	18	1	19	61,200	1,360	1,267	0	0	0	0	0	0	0	2	2	4
West Virginia	6	1	5	0	18,247	577	621	0	0	0	0	0	0	0	8	4	12
Ohio	17	7	2	8	36,479	920	972	0	0	0	0	0	1	0	6	27	34
Indiana	29	9	0	20	46,521	1,293	1,482	0	0	0	10	10	58	0	3	453	514
Kentucky	28	13	0	15	55,953	1,204	1,085	3	0	0	3	6	41	0	2	207	250
Illinois	46	15	0	†31	125,741	2,220	2,710	4	0	0	19	23	95	0	0	690	785
Michigan	11	2	0	9	24,819	720	840	0	0	0	3	3	17	0	6	302	325
Kansas	83	44	2	37	272,891	4,134	3,709	2	0	0	27	29	187	1	12	848	1,048
Nebraska	3	0	0	3	16,403	223	122	3	0	0	0	3	20	0	2	109	131
Oklahoma	99	63	5	†31	325,586	5,250	5,121	9	0	0	11	20	180	5	21	693	899
Texas	309	181	18	110	1,497,525	15,591	15,556	14	1	6	69	90	709	53	126	3,259	4,147
North Central (Dist. 7-B & 9)	94	43	9	42	320,140	4,757	4,719	5	0	3	28	36	347	3	20	1,402	1,772
West (Dist. 7-C & 8)	99	73	2	24	563,250	4,738	4,696	3	0	1	19	23	173	10	9	608	800
Panhandle (Dist. 10)	8	2	5	1	27,986	675	841	0	0	0	1	1	2	0	0	32	34
Eastern (Dist. 5 & 6)	16	9	0	7	88,356	1,087	1,080	1	0	0	2	3	10	9	2	216	237
Gulf Coast (Dist. 2 & 3)	35	16	0	19	215,655	2,156	2,180	2	1	0	7	10	91	21	57	450	619
Southwest (Dist. 1 & 4)	57	38	2	17	282,138	2,178	2,040	3	0	2	12	17	86	10	38	551	685
Louisiana	64	30	7	27	328,800	2,070	2,311	0	0	0	9	9	42	10	8	285	345
Northern	48	18	7	23	192,657	1,151	1,242	0	0	0	8	8	15	0	5	171	191
Southern	16	12	0	4	136,143	919	1,069	0	0	0	1	1	27	10	3	114	154
Arkansas	11	6	0	5	42,309	400	380	0	0	0	0	0	15	1	2	78	96
Mississippi	10	2	0	8	74,544	351	292	2	0	0	5	7	16	4	0	144	164
Southeastern States	0	0	0	0	0	46	56	0	0	0	0	0	1	0	0	18	19
Montana	7	3	0	4	13,006	240	246	0	0	0	0	0	0	0	1	41	42
Wyoming	6	4	0	2	28,498	708	568	0	0	0	0	0	15	0	1	103	119
Colorado-Utah	7	1	0	6	35,778	293	102	5	0	0	0	5	14	0	7	130	151
New Mexico	18	10	4	4	87,538	665	573	0	0	0	2	2	13	0	10	76	99
California	52	30	0	22	219,079	2,197	1,725	1	0	0	18	19	55	0	5	450	510
Miscellaneous (Md.)	2	0	1	1	8,140	79	53	0	0	1	1	2	1	0	25	53	79
Total United States	858	445	45	368	3,336,157	41,149	40,433	43	1	7	177	228	1,480	74	247	7,972	9,773
Total previous week	850	421	55	374	3,352,693	....	....	27	1	7	189	224	1,437	73	240	7,795	9,545
Total December 8, 1950	842	475	48	319	3,366,899	....	....	20	1	7	165	193	1,054	71	202	6,184	7,511

Service wells included: *6, †18, ‡1.





DAILY AVERAGE PRODUCTION FOR WEEK

	Dec. 8 crude oil	B. of M. Dec. demand	Dec. 1 crude oil
Alabama	2,850	2,400	2,900
Arkansas	76,450	84,000	76,300
California	988,100	995,000	986,200
Colorado	80,200	75,000	78,300
Eastern	56,000	61,000	53,500
Florida	1,650	1,600	1,600
Illinois	170,800	161,000	165,900
Indiana	32,700	31,000	31,400
Kansas	325,450	319,000	315,150
Kentucky	35,300	31,000	35,000
Louisiana	601,000	648,000	601,325
North Louisiana	111,450		110,700
South Louisiana	489,550		490,625
Michigan	36,700	40,000	39,700
Mississippi	93,650	102,000	96,850
Montana	26,500	26,000	25,300
Nebraska	7,600	8,000	7,700
New Mexico	148,825	155,000	149,725
Oklahoma	516,500	530,000	515,700
Texas	2,753,050	2,780,000	2,789,000
Dist. 1 (Southwest)	32,700		33,300
Dist. 4 (Southwest)	251,900		255,200
Dist. 2 (Gulf Coast)	163,300		166,500
Dist. 3 (Gulf Coast)	462,200		466,675
Dist. 5 (Eastern)	52,600		54,125
Dist. 6 (Eastern)	123,025		121,900
East Texas field	268,500		277,500
Dist. 7-C (West)	116,150		113,750
Dist. 8 (West)	956,825		975,675
Dist. 7-B (W. Central)	84,300		83,175
Dist. 9 (N. Central)	158,000		158,000
Dist. 10 (Panhandle)	83,550		83,200
Utah	4,300	5,000	4,100
Wyoming	187,000	190,000	187,100
Total United States	*6,144,625	6,245,000	6,162,750
Change from prev. week, down	18,125		
Canada	103,700		128,460

Total U. S. production January 1-December 8 †2,098,479,810 bbl.
Same period last year (crude plus cond.) 1,849,051,665 bbl.

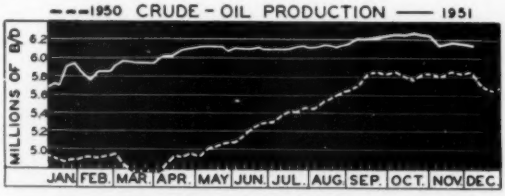
*Not incl. 114,975 bbl. condensate. †Incl. 36,145,935 bbl. condensate.

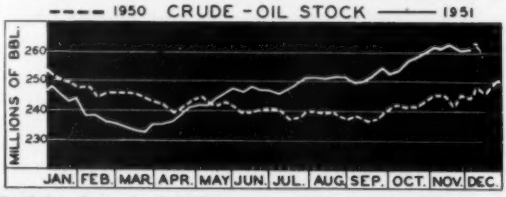
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

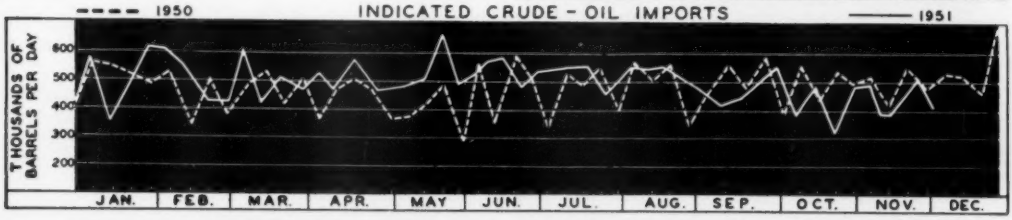
(Thousands of barrels)

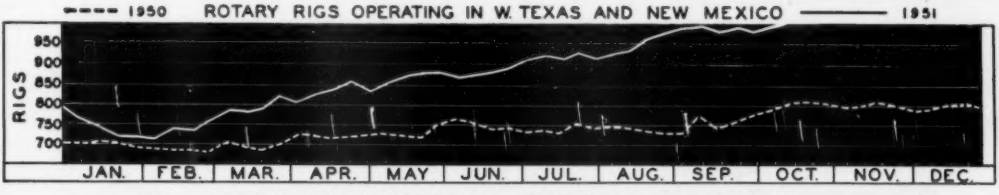
	Dec. 1, 1951	Nov. 24, 1951	Dec. 2, 1950
Pennsylvania Grade	2,086	1,932	2,097
Other Appalachian	1,867	1,686	1,233
Illinois, Indiana, Michigan	12,289	12,561	10,419
Arkansas	3,047	2,691	2,383
Louisiana	14,085	14,648	13,888
North	2,810	2,811	2,810
Gulf	11,275	11,837	11,078
Mississippi	3,546	3,581	2,128
New Mexico	6,931	7,184	7,067
Oklahoma and Kansas	40,207	40,825	38,262
Texas	128,216	126,131	121,516
East Texas	15,605	15,660	14,542
West Texas	54,874	54,480	47,342
Texas Gulf	28,198	27,549	29,604
Other Texas	29,539	28,434	30,028
Rocky Mountain	13,929	14,263	11,221
California	28,997	29,004	30,576
Foreign	5,701	5,959	6,957
Total	260,901	260,465	247,747

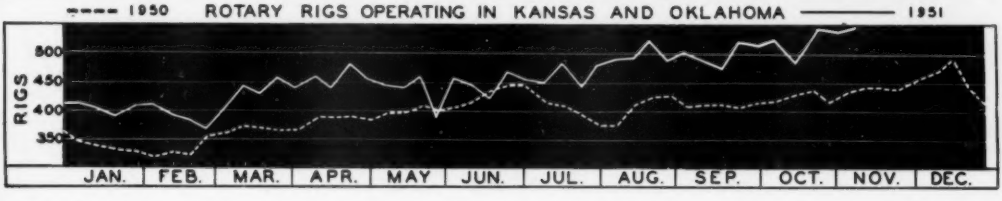
*Bureau of Mines.









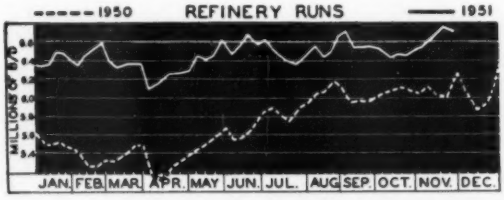


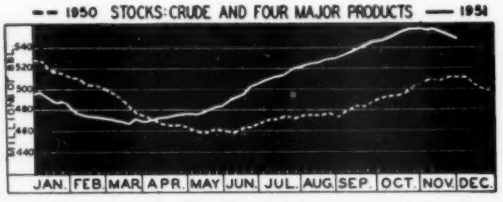
A.P.I. REFINERY REPORT, DECEMBER 1

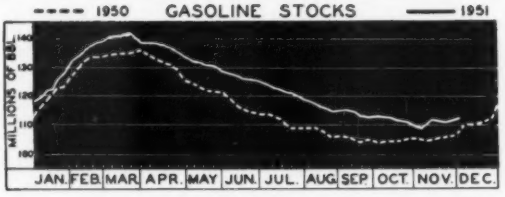
(Thousands of barrels)

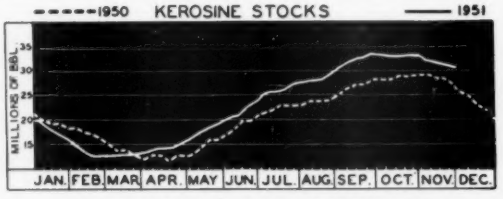
District—	Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual	Stocks at refineries, bulk terminals, in transit and in pipe lines: Gasoline†	Kerosine	Distillate	Residual	Bureau of Mines, December 1950: Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual
East Coast	1,046	411.1	38.6	312.2	232.0	24,856	10,471	33,329	10,868	951	386.9	44.0	254.7	234.4
Appalachian:														
District 1	103	44.0	5.0	20.4	13.7	2,740	548	953	621	95	42.0	5.2	15.5	11.1
District 2	75	38.9	5.4	13.4	17.6	1,064	376	295	274	65	32.0	5.3	7.0	16.4
Ind., Ill., Ky.	1,222	675.0	74.7	233.0	190.7	24,670	6,398	19,033	6,183	1,103	550.6	75.9	200.8	173.6
Okla., Kans., Mo.	524	301.1	12.9	133.3	69.9	12,195	1,719	11,433	1,969	514	274.5	18.6	121.2	71.4
Inland Texas	238	161.3	10.3	48.0	39.3	3,619	603	2,029	1,398	214	147.3	12.9	31.6	41.0
Texas Gulf Coast	1,598	736.9	136.5	350.7	251.8	17,059	5,328	14,020	7,107	1,506	674.6	128.0	375.2	283.2
La. Gulf Coast	527	229.1	77.4	99.4	65.0	6,028	3,311	3,837	2,204	499	235.2	52.8	132.8	64.2
N. La. and Ark.	82	36.0	7.4	16.3	7.8	2,741	765	1,287	169	69	28.1	8.3	14.6	9.9
Rocky Mountain:														
New Mexico	15	8.3		2.9	3.9	114		93	36	15	7.9	.3	2.7	3.5
Other Rocky Mtn.	242	112.4	9.7	47.3	50.7	3,625	373	1,683	978	213	99.7	7.1	42.8	46.0
California	1,018	438.2	—2.6	190.4	369.3	13,767	485	8,316	14,984	900	399.9	4.9	143.9	351.0
December 1, 1951	6,700	3,192.3	375.3	1,467.3	1,311.4	112,478	30,377	96,308	46,791	6,144	2,878.7	363.3	1,342.8	1,305.7
November 24, 1951	6,757	3,168.7	408.9	1,346.9	1,339.3	111,698	31,661	98,986	47,591					
December 2, 1950	6,034	2,845.3	368.7	1,230.4	1,217.3	109,509	26,491	84,891	45,221					

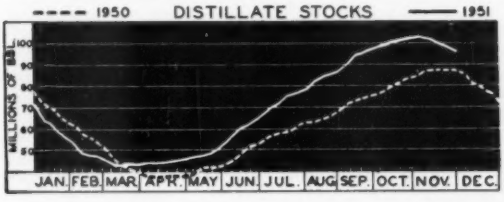
*At refineries including natural blended. †Finished and unfinished.

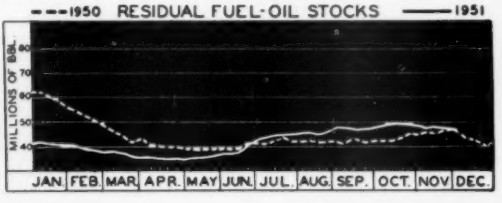


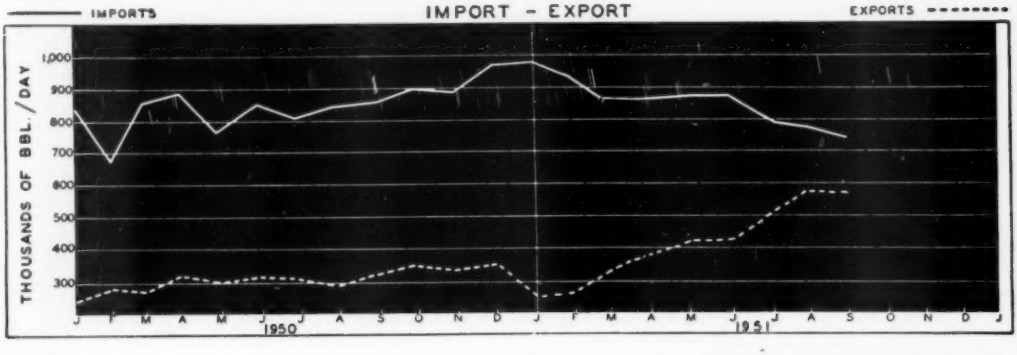












CRUDE PRICES

GRAVITY SCHEDULE

	Signal Hill, Calif.‡	Oklahoma, Kansas	Gulf Coast Tex.*	West Tex†
18-18.9	$1.93			
19-19.9	1.98			
20-20.9	2.03	$2.25		$2.12
21-21.9	2.07	2.27		2.14
22-22.9	2.12	2.29		2.16
23-23.9	2.18	2.31		2.18
24-24.9	2.24	2.33	$2.56	2.20
25-25.9	2.30	2.35	2.58	2.22
26-26.9	2.36	2.37	2.60	2.24
27-27.9	2.41	2.39	2.62	2.26
28-28.9	2.46	2.41	2.64	2.28
29-29.9	2.52	2.43	2.66	2.30
30-30.9	2.57	2.45	2.68	2.32
31-31.9	2.62	2.47	2.70	2.34
32-32.9	2.68	2.49	2.72	2.36
33-33.9		2.51	2.74	2.38
34-34.9		2.53	2.76	2.40
35-35.9		2.55	2.78	2.42
36-36.9		2.57	2.80	2.44
37-37.9		2.59	2.82	2.46
38-38.9		2.61	2.84	2.48
39-39.9		2.63	2.86	2.50
40 and above		2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6, 1947.

‡Standard Oil Co. of California.

FLAT CRUDE PRICES

Representative posted schedules per barrel	
East Texas†	$2.65
Kettleman Hills, California*	2.80
Beauregard Parish	2.60
Illinois Basin	2.77
Pecos County, Texas (Yates)	2.35
Bradford, Pennsylvania	4.25
Eastern Ill. and Western Ind.†	2.77
Tomball, Texas Gulf Coast	2.83

*37-37.9°. †35° and above.

WARMER weather for the northeastern states in the first week of December tended to slow down tank-wagon deliveries of No. 2 fuel, but this was to be expected since both sales and survey figures have indicated that more users filled their tanks early and have been keeping them filled.

These short periods of reduced consumption will have little or no effect on the tank-car and barge market during the first half of the heating season. Most of the inventories in New York Harbor and other large terminal areas of the northeastern states are held by suppliers with a near balance between supply and demand for the season. Any supplier who sells any kerosine or No. 2 fuel on the open market in December runs the risk of having to replace that material in the last half of the heating season with material purchased on the open market in the Gulf Coast and shipped in tankers at spot rates. It would take a winter of record-breaking high temperatures to reduce product prices and tanker rates enough to permit delivery of this material to storage in New York Harbor at current ceiling prices.

Spot rates for clean tankers have moved up to Maritime Commission base plus 200 per cent or about 2.7 cents a gallon for moving No. 2 fuel from the Gulf Coast to points north of Hatteras. Early in the month it was reported that several vessels were chartered for a year's consecutive voyages at MC plus 100 per cent. Continuation of high tanker rates may result in more material offered at points on the Gulf Coast.

Any spread of the service-station price war from Chicago to other areas will be an indication of a general softening of the gasoline market. Up to now, high demands for gasoline have held stock increases at normal rates despite near-record production at refineries.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotations of leading suppliers as of December 10, 1951. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline, 80-82 octane	10¼-10½	12-12.75	10¾-11
Premium gasoline, 86-88 octane	11¼-11½	13.5-13.75	11¾-12
42-44 w.w. kerosine	9-9⅜	10-10.1	9
No. 2 straw fuel oil	8¼-8½	9-9.25	8
No. 6 residual	$1.65-1.75	$2.45-2.60	$1.75-1.90

NATURAL GASOLINE

	North Group 3	Texas	N. La.
Grade 26-70	6⅞	6⅞	6⅝
Grade 18-55	8.25	7.75	8.0

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	13-13.5
750 vis., No. 3-4 neutral	16
2,000 No. 5-6 neutral	18-19

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	29-30
200 vis., No. 3 neutral, 0-10 pp.	17.5-18.5

Western Pennsylvania

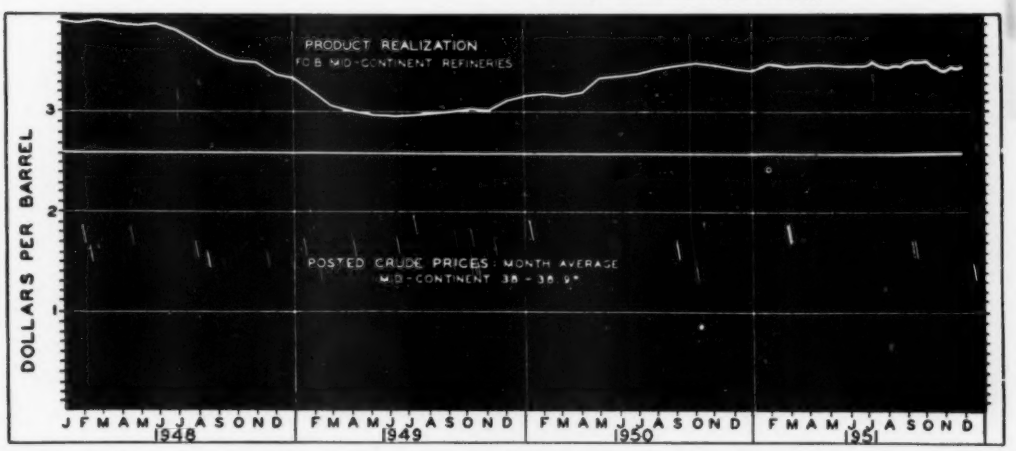
145-155 vis., 10 p.t. bright stock	32.5
180 vis., 0 p.t. neutral	31.5

WAX

Mid-Continent

132-134 A.M.P.	5.5

(Starting with the first issue of 1952, price quotations will be as of Wednesday each week instead of Monday)


PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
POSTED CRUDE PRICES: MONTH AVERAGE
MID-CONTINENT 38 - 38.9°
DOLLARS PER BARREL
3
2
1
J F M A M J J A S O N D
1948
F M A M J J A S O N D
1949
F M A M J J A S O N D
1950
F M A M J J A S O N D
1951

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate, and fuel oil. Realization averaged $3.47 for week ended December 1, $3.46 for previous week, and $3.50 for December 1950.

EQUIPMENT MEN . . . in the News

Pacific Valves Promotes Macaulay, Steinberger

Pacific Valves, Inc., announces the promotion of R. C. (Bob) Macaulay to the position of vice president and

R. C. MACAULAY

C. STEINBERGER

general sales manager with headquarters at the company's main office in Long Beach, Calif. Macaulay has been associated with Pacific Valves for a number of years as sales manager of the West Coast division.

Chester (Chet) Steinberger has been appointed vice president and general manager of Pacific's Gulf Coast division. Steinberger has been associated with the company for many years as manager of the Houston office. His headquarters will remain at Houston.

John Gryson, formerly sales engineer for Pacific Valves, will replace Macaulay as West Coast sales manager.

Timken Promotes Cook To Sales Engineer

Robert E. Cook, field engineer with Timken Roller Bearing Co.'s Cleveland office, has been named to the position of sales engineer of the steel and tube division at Cleveland.

Cook, who formerly represented Timken's graphitic tool steel line, will represent all products of the steel and tube division in his new position.

Cook has been with The Timken Roller Bearing Co. since 1939.

New Corporate Name for International Cementers

E. S. Dulin, president of Byron Jackson Co., has announced that at a recently held directors' meeting of International Cementers, Inc., the name was changed to BJ Service, Inc. As soon as necessary permission is obtained from the various states in which BJ Service, Inc., is qualified, all future operations will be conducted under the new name. Steps were also taken to amalgamate certain oil-field services now operated as a division of Byron Jackson Co. with the new service subsidiary.

BJ Service, Inc., opened new service facilities at Seagraves, Tex., on December 1, and service will be available at Rankin,. Tex., on or about January 1. A service station was recently opened at Williston, N. D., in order to render service to the new Williston basin area.

Olson Is Named President Of Taylor Instrument

At a recent meeting of the board of directors of Taylor Instrument Companies, Raymond E. Olson was elected president, succeeding Lewis B. Swift, who was named chairman of the board.

R. E. OLSON

Olson joined Taylor in 1917 and in 1927 became manager of the application engineering department. In 1944 he was elected to the board of directors, named general sales manager in 1945, and vice president in 1946. He is also a vice president of Taylor Instrument Companies of Canada, Ltd.

All other officers were reelected as follows: Herbert J. Noble, executive vice president and treasurer; Fred K. Taylor and P. Richard Jameson, vice presidents, and Rodney C. Mertz, secretary. The above officers were reelected as directors and in addition the following: David C. Barry, M. Herbert Eisenhart, Karl H. Hubbard, Harry Y. Norwood, Arthur F. Reed, and Thomas M. Stewart.

Vinson Appoints Lowary to Oklahoma City Sales Post

Thomas B. Lowary has been appointed Oklahoma City area sales representative for Vinson Supply Co. Lowary is well known in oil circles in Oklahoma, having been division engineer with one of the major oil companies in the Oklahoma City district. He is an engineering graduate of Oklahoma University.

T. B. LOWARY

George R. McDannold, formerly at Oklahoma City, has been transferred to Vinson's Tulsa office.

Warner Names McComb To Advertising Post

Donald R. McComb has been named advertising manager of Warner Electric Brake & Clutch Co., Beloit, Wis., it has been announced by Steven P. J. Wood, vice president and general manager.

McComb, formerly associated with the Firestone Tire & Rubber Co., has been with the Warner organization since 1947.

Clary Named Field Engineer

Robert B. Clary joined Rice Engineering Co., Chase, Kans., as field engineer on November 17, 1951. Clary is a graduate of Kansas State College and has a degree both in mechanical engineering and business administration.

Oil Center Tool Opens New Warehouse

Oil Center Tool Co., Houston, has opened a new warehouse store in Corpus Christi. The new location is part of an expansion program to better serve the oil industry in South Texas. Mike Hunter is southwest district manager with headquarters at Corpus Christi.

Seismograph Service Celebrates 20th Anniversary

Seismograph Service Corp., of Tulsa, celebrated its twentieth anniversary on November 3, 1951.

"Since November 1931 the company has built up its operations in the United States, Venezuela, Canada, Mexico, Trinidad, Iraq, Nigeria, Papua, and the Kuwait Neutral Zone to a total of 54 seismic, gravity, and gamma ray units," says G. H. Westby, president of the company.

Coincident with this event, S.S.C. held its annual meeting at which all employes to be awarded recognition for service, and all party chiefs and supervisors attended. Also in attendance this year were J. E. Dorris, R. F. Aldredge, and H. C. Bickel, managers of the Venezuelan, Mexican, and Canadian divisions, respectively. Some 90 of the top men of the company met for two full days of technical meetings. A brief paper was presented by each of the officers, foreign managers, and supervisors present, and several technical papers were presented each day by supervisors and party chiefs.

In attendance at the Seismograph Service Corp. annual meeting were, first row, left to right: J. G. Jackson, H. H. Andrews, T. H. Evans, L. G. Cornish, R. A. Pohly, H. C. Bickel, R. H. Aldredge, H. M. Thralls, A. J. Barthelmes, G. H. Westby, J. E. Hawkins, A. B. Chappell, J. L. Hull, Jr., J. E. Dorris, F. B. Leedy, R. W. Mossman, J. A. Ries, and R. S. Finn. Second row: Van Roberts, J. Henderson, W. H. Van Horn, E. D. Wilson, C. C. Smith, M. G. Steil, S. W. Wilcox, R. W. Saubert, C. E. McClure, R. E. Baum, H. R. Breck, E. H. Kurk, S. W. Fruehling, R. K. Finley, J. R. Blaisdell, C. C. Bury, R. W. Baltosser, Grace Gorham, and Grace Porch. Third row: E. D. Boatright, C. Vinyard, L. R. Earl, C. H. Massie, H. W. Haag, B. G. Preston, C. E. McMunn, M. B. Jones, R. S. Fischer, R. S. Sprecker, H. L. Richardson, F. D. McCalman, W. R. Holford, P. E. Goodwin, R. E. Lee, F. R. Hess, Pearl Welch, H. R. Parmenter, J. B. Rogers, C. W. Hyatt, E. A. Langpaul, R. O. Durst, R. L. Heineck, and J. L. Catt. Fourth row: H. S. Eshelman, L. G. Morris, H. S. Jennings, D. B. Harris, M. A. Hancock, A. M. House, J. E. Ward, R. L. Whitaker, F. M. Cowell, J. C. Davis, A. A. Milton, F. I. Garrette, W. H. Denton, F. E. Haag, H. Jenkins, J. W. Hortman, R. S. Phillipi, W. R. Doll, L. S. Buckie, L. L. Hauth, W. H. Gage, A. H. Manhart, W. W. Green, W. O. Heap, and J. C. Hammer.

United Geophysical Co. Builds $750,000 Plant

United Geophysical Co.'s new plant at Pasadena, Calif.

United Geophysical Co.'s new modern $750,000 plant at Pasadena, Calif., is laid out according to established production procedure, insuring a natural progression of functions. Each of the company's five divisions, research and development, engineering and supply, operations, interpretation and computation, and finance, is housed in separate buildings.

The research division is well outfitted with an extensive library. Special facilities include new measuring instruments, a model test hole, electrically shielded rooms, a high-pressure test chamber, and research trucks.

The engineering and supply division is especially equipped to take the equipment the research group has developed and furnishes the production engineering, finished design, manufacturing, and procurement facilities for field crews.

The construction department makes the electronic equipment, cameras, seismometers, galvanometers, and all recording instruments, and an installation shop is maintained to outfit trucks with custom bodies and specialized geophysical equipment.

Williamson Appoints Canadian Agent

T. D. Williamson, Inc., Tulsa, has announced the appointment of Canadian Equipment Sales & Service Co. of Edmonton, Alta., and Toronto, Ont., as its exclusive agent in Canada. This appointment became effective December 1, 1951.

Weatherford Opens New Houston Offices

R. H. HUME

Effective September 17, 1951, Weatherford Oil Tool Co., Inc., established new offices in Houston. All matters referring to sales will be handled from this point.

The headquarters of R. H. Hume, general manager of the company, have been transferred to the Houston office from the home office at Weatherford, Tex. The accounting department has also been transferred to the Houston office.

Jesse E. Hall, Sr., Jesse E. Hall, Jr., Elmer Hall, and John Hall, administrative head of the company, will remain in Weatherford.

Dowell Opens New Station In North Dakota

A new operating station at Williston, N. D., has been opened by Dowell Incorporated, a nationally known firm specializing in services for the petroleum industry.

J. A. McClure, Dowell sales engineer from Salem, Ill., is in charge of the Williston station.

The new station has been established to offer fast, complete, and readily available acidizing, electric pilot, and perforating services to operators in the Williston basin.

McClure, a graduate engineer from Oklahoma A. & M. College, has been with Dowell since January 1949. He

will be assisted at the Williston station by R. L. Monfort, Great Bend, Kans.

The new station is part of Dowell's Wichita district. J. A. Cummin is district manager.

G. C. Shivers Forms Seismograph Firm

G. C. Shivers, Jr., president of Southwestern Consultants, Inc., has announced the formation of a contract seismograph firm, with home offices in Tulsa.

Southwestern Consultants is at present operating five seismograph field parties in the Mid-Continent and Rocky Mountain areas. Shivers sent out his first crew in mid 1950.

A graduate of Mississippi College, Shivers received his early training in the geophysical industry with Western Geophysical Co., where he attained the position of party chief.

Shivers has had extensive geophysical experience in Louisiana, Mississippi, Georgia, Tennessee, Kentucky, Ohio, New York, Wyoming, and Colorado. He joined Southern Geophysical Co. in Fort Worth early in 1949 and advanced to the position of supervisor before leaving to form Southwestern Consultants. During his stay with Southern he did geophysical work in West Texas and Oklahoma.

Warner Lewis Co. Expands Fabrication Facilities

A plant-expansion program involving new fabrication equipment and a new building has been announced by Warner Lewis Co.

The expansion program has been sparked by numerous Government contracts for excel-so separators, dehydrators, filters, and proving tanks for Army and Navy use.

With the announcement of the new added facilities, Warner Lewis Co. is now soliciting all types of nonferrous fabrication, such as monel, inconel, nickel, aluminum, brass, stainless steel, silicon, bronze, clad steel, and alloy steels.

The extra shop space and new equipment will enable the company to handle pressure vessels, mixers, kettles, piping, tanks, and small towers.

The Warner Lewis Co. was organized in 1931 as a manufacturers' agent but the manufacturing of steel vessels was begun late in 1946. The company has received recognition in the petroleum industry for its progress in separation, dehydration, filtration, and meter-calibration equipment.

Worthington Representatives Meet in Chicago

Worthington representatives attending the thirty-first annual convention of the American Petroleum Institute at Chicago held a special meeting recently for the purpose of coordinating Worthington's sales and service to the petroleum industry. Seated at the table: P. J. Foley, Milwaukee; A. H. Borchard, Harrison; P. A. Mack, St. Louis; W. R. Kennedy, Kansas City; L. R. Dice, Chicago; J. V. Jirasek, Harrison; W. O. Wilson, Chicago; G. R. Hammett, New Orleans; A. W. Fraser, Chicago; J. Charls, Jr., Harrison; J. T. Carroll, Chicago; H. M. Boteler, Buffalo; R. P. Lockett, New Orleans; W. A. Meiter, Detroit; R. B. Scott, St. Paul; W. C. Cheek, Chicago; J. P. McArthur, San Francisco; C. E. Searle, vice chairman of Worthington's board of directors; W. H. Feldmann, vice president in charge of sales and chairman of the meeting; M. M. Lawler, Harrison; R. J. Laidlaw, Cleveland; C. E. Hood, New York City; W. D. Smith, Tulsa, and F. J. Whelan, Harrison.

Beaumont Cement Sales Purchased by Mud Products

RALPH NATION

C. STEPHENS

Beaumont Cement Sales Co., New Orleans, has recently been purchased by Mud Products, Inc., Tulsa, according to E. R. Albert, Jr., president and general manager of Mud Products.

The new management of Beaumont Cement Sales Co. includes: Ralph Nation, vice president and general manager, formerly the Oklahoma division manager for Mud Products; and Charles Stephens, secretary-treasurer and office manager, formerly Tulsa office manager for Mud Products. Other sales and operating personnel of the purchased firm remain unchanged.

Properties of this new company include 23 warehouses plus three water warehouses now under construction at Leeville, Cypremont, and Houma, La. The company operates four LCT boats for deliveries in coastal waters, and uses two Cessna float-equipped planes for checking and expediting orders.

Beaumont Cement Sales Co. was organized in 1929. The area in which it has operated, and which will continue to be the major servicing area, is roughly along the Gulf Coast of Louisiana, extending inland some 150 miles and into the Gulf as drilling operations may demand.

The New Orleans firm will continue to distribute a complete line of products manufactured by Baroid Sales Division of National Lead Co. In addition it will carry a complete line of drilling chemicals and lost-circulation materials.

Consolidated Engineering Names Lancor a Director

J. H. LANCOR, JR.

Appointment of Joseph H. Lancor, Jr., as director of the Transducer Division of Consolidated Engineering Corp., Pasadena, Calif., has been announced by Philip S. Fogg, president of the company.

In his new position, Lancor will supervise and direct the design and development of transducers of various types including vibration pickup, accelerometers, and pressure pickup.

Before joining Consolidated Engineering, Lancor was director of product engineering of Vitro Corp. of America (formerly Kellex Corp.) from 1947 to date. From 1938 to 1946 he was a research engineer for Sperry Gyroscope. Prior to that he was a research assistant at Massachusetts Institute of Technology, assisting in research on detonation in internal combustion engines.

Cummins Promotes Davis To Regional Manager

R. F. DAVIS

R. F. Davis, former assistant regional manager, Cummins central region, has been promoted to regional manager, Cummins eastern region, with offices in New York City, according to an announcement made by L. W. Beck, vice president of sales, Cummins Engine, Co., Inc., Columbus, Ind.

Davis has been employed by Cummins since 1942. He first served as an inspector on the Cummins production line, and in 1944 was transferred to the Cummins purchasing department, where he became a field expediter. In September 1947 Davis became manager of engine sales, and in 1948 he joined the Cummins regional organization.

Walter N. Westland, former regional manager, Cummins eastern region, now heads Cummins Diesel of New England, Inc., with headquarters at Allston, Mass.

Carey Made West Texas Manager for Sievers Co.

G. CAREY

Following a recent trip through West Texas, Bill Sievers, of W. E. Sievers Corp., announced the appointment of Gus Carey as manager in this area. Sievers Corp. is exclusive distributors for Kingseal, a highly successful lost-circulation material. Carey was formerly with Reed Roller Bit Co. in West Texas.

Arrangements have been made for leading companies in the West Texas area to subdistribute the Kingseal product.

Vapor Recovery Products Now Manufactured in France

Frank V. Long, Sr., president of Vapor Recovery Systems Co., has announced the appointment of Compagnie Technique des Petroles as a manufacturing affiliate with headquarters in Paris, France.

Zarry Toula, managing director of C.T.P., has had approximately 25 years' experience in the actual construction and operation of oil refineries and chemical plants throughout Europe. Emeric Kroch, chemical engineer, who has been general European agent for Vapor Recovery for the past 19 years, with offices in Brussels, Belgium, will also be available for technical assistance.

All Varec tank equipment, gas control, and safety devices manufactured in France will carry the same guarantee as those manufactured at Compton. Equipment in France will be made from master patterns fabricated at the Compton plant.

Martin & Schwartz Merge With Wayne Pump Co.

The merger of Martin & Schwartz, Inc., of Salisbury, Md., with Wayne Pump Co. of Fort Wayne, Ind., was approved at a recent stockholders' meeting of Wayne Pump Co.

W. H. Bateman, formerly president of Martin & Schwartz, was elected president of Wayne Pump at a meeting of the directors in New York in November 1951. C. E. Franks, formerly president of Wayne Pump, was elected chairman of the new board of directors, which consists of 11 members. Four new members of this board include: C. J. Symington, director and chairman of the board of Symington-Gould Corp.; James J. Minot, Ray Morris, and J. A. Sauer, all of New York and all directors of the Symington-Gould Corp. Other directors, previously on the board are: Charles H. Buesching, president of Lincoln National Bank & Trust Co.; Willard Shambaugh, Fort Wayne attorney; Otis E. Kline, Chicago United Air Lines executive, and Henry Herrman of New York.

Dragline Used to Build Tank Farm Fire Walls

A Lorain-TL dragline, owned by Brooks & Droddy, of Eldorado, Tex., and working for Gasoline Plant Construction Co., Houston and Corpus Christi, builds a fire wall around a tank farm 5 miles north of Eldorado. The farm, consisting of nine 93,000-bbl. tanks, is owned by Triangle Pipe Line Co. of Shreveport, and required a dike 10 ft. high and 8,100 ft. long to contain it.

Weco Names Parker to Southern Sales Post

E. W. PARKER

Eli W. Parker has been appointed South Louisiana sales representative for Well Equipment Manufacturing Corp., according to an announcement by John W. Gates, sales manager.

Parker has been engaged in oil-field sales and service work since 1936 when he began with the production and drilling departments of The Texas Co. in South Louisiana. For a number of years he was a sales representative for a leading oil-tool manufacturer, and field representative for a major supply company in Houston. For the past 3 years, as service engineer for a drilling-mud company, Parker has been designing mud systems for operators on the Texas and Louisiana Gulf Coast.

Before taking over his new duties, Parker will complete a training course in the Weco plant, studying the manufacture and service of Weco products.

Ferguson, Lindstrom Moved Up by General Controls

John R. Ferguson has been appointed district manager of General Controls Co.'s branch office at Denver, Colo., and Herb Lindstrom, former Denver branch manager, has assumed a similar position at the Minneapolis branch, as announced by J. F. Ray, vice president in charge of sales. Ferguson formerly managed the Salt Lake City branch office.

Ferguson and Lindstrom will be in charge of all activities in their respective territories, including sales, engineering and service on General Controls' extensive line of automatic controls.

Ruyle Made Advertising Manager for Gardner-Denver

Carson L. Ruyle has been appointed advertising manager of Gardner-Denver Co., Quincy, Ill., according to a company announcement. Ruyle assumes the position formerly occupied by Damon P. Tunnicliff, who has been called to active military service.

Ruyle joined Gardner-Denver in 1930, serving in various capacities in the company's engineering and accounting departments. After a brief absence from the company, he rejoined in 1941 and since then has been a member of the sales division at the Quincy office. His work with the company has given him a thorough knowledge of product features and sales procedures.

CLASSIFIED ADVERTISING

Your MARKET PLACE FOR THE OIL AND GAS INDUSTRY...

DISPLAY CLASSIFIED
$12.00 a column inch one issue . . .
10% Discount three or more issues.

UNDISPLAYED CLASSIFIED 15c a word one issue. 10% Discount three or more consecutive issues. $3.00 minimum charge. Blind Box in our care nine words. Payable in Advance.

EQUIPMENT FOR SALE

FOR SALE: Seamless casing and tubing new and second hand. Phone Rogers Pipe and Supply Co., Tulsa, Okla.

PIPE
All sizes; line pipe and casing, tanks, and Oilfield supplies. Edco Pipe & Supply Co., Phone 98434, P.O. Box 4193, Tulsa, Oklahoma.

PIPE threading machines. One—3½" to 7". One—6" to 14". Complete with 10 HP electric motors, switches, and dies. Excellent condition. Will sacrifice price for quick sale. See at Western Construction Co., Hobbs, N. M. Phone 3-4134.

FOR SALE: Westcott, Foxboro and Emco Gas Meters. Geo. R. Milner, Box, 124, Okmulgee, Oklahoma.

FOR SALE: 36-L Bucyrus-Erie in excellent condition with or without tools. Casing as follows: 700'—12" I.D., 600'—10" I.D., 900'—8" I.D., 1800'—6⅝" I.D. Or would be interested in drilling contract—would take small interest. Send particulars to: Herman Sill, R.F.D. #3, Box 63, Joplin, Missouri.

LIGHT PLANTS: New and rebuilt. Witte & Shepherd. Diesel Light Plants, 5 to 15 KW, A. C. 60 Cycles, 110-120 Volts. Single or 3 Phase. Priced to sell. Irick Electric Co., Inc., Box 928, Gallup, New Mexico.

FOR SALE: One super model Wilson single drum servicing unit, 80 hp. Waukesha, 4,000' wire, all tubing tools, mounted on GM 4-wheel drive truck. $3500. Phone Rogers Pipe and Supply Co., Tulsa, Okla.

20 BRAND NEW HERCULES POWER UNITS

20 Standard Closed Type RXC Power Units—6 cyl. gasoline engines (529 cu. in. disp.). Include water pump and connection, fan, manifolds, carburetor, air cleaner, electric starter, generator and battery ignition.

AT LIQUIDATION PRICES

Includes Pierce governor, Twin Disk clutch, cast iron radiator with removable copper core with tanks, exhaust pipe. Enclosed in a heavy-gauge sheet metal housing with removable slide panels. Mounted on formed channel base. All controls and oil pressure gauge are in control box on rear panel of engine housing.

Write, Wire or Phone Today

MYERS-SHERMAN CO.
1241 So. Illinois St., Streator, Illinois

EQUIPMENT FOR SALE

FOR SALE: U-15 rotary rig in first-class condition. Has 3 NKU Waukesha motors with less than 1 year service. About 6,000 ft. Grade E drill pipe. No mast. New 16" pump. Located at Okla. City. $95,000. Altus Drilling Co., Okla. City. 3-2331.

WILSON Giant draw works General Motors Twin 12103, excellent condition, located Great Bend, Kansas, price $15,000.00. Charles Spitzfaden, Box 2001, Wichita, Kansas.

83—6" & 8" T's & L's. 3 Reducers. 1—10" L. Crane 125# cast, flange. Used, clean, new condition, ⅓ off net price. C. Pierce, 2436 Clinton Ave., Minneapolis 4, Minn.

FOR SALE: Failing 2500' capacity Rotary, mounted on tandem drive International. 55' derrick, 28' kelly. Box E-511, The Oil and Gas Journal, Tulsa, Oklahoma.

SPUDDERS, rotaries, core drills. New and reconditioned equipment. Tools, cable, drill pipe, casing, tubing, pump jacks in stock. Everything for well service. Fishing tools rented. Pressey & Son, Pueblo, Colo.

ROTARY MUD PUMP: 6 X 16 Oilwell, good condition, recently overhauled, subject your inspection. $6500.00. Write Howse Drilling Company, 208 Grant Bldg., Abilene, Texas. Phone 2-3780.

FOR SALE: Two 3000 bbl. Butler bolted tanks good condition. Can ship immediately. Wentz Fuel Oil Company, 1012 No. 16th St., Lincoln, Nebraska.

FOR SALE

2—Heavy Duty Hydraulic Pipe Straighteners—Skid Mounted.

1—Tobin-Arp Line Boring Machine.

1—9" x 3¾" x 6" Chicago Pneumatic Water Cooled Compressor — Skid Mounted.

BIG FOUR MACHINE & SUPPLY CO.
Pawhuska, Okla.

EQUIPMENT FOR SALE

USED rotary and cable tool drilling tools, wire lines, E. A. Kelly, Box 861, Oklahoma City. Phone 5-6407.

AS IMPORTERS of Steel we can furnish you with European or Japanese Steel Products of all types. Let us have your inquiries. Hemisphere International Corp., 1404 Hibernia Bank Bldg., New Orleans, La.

HOLBART Welder complete, gasoline engine. Cable 300 ABP like new. Edward Kreft, 1446 So. Vandeventer Ave., St. Louis 10, Mo.

EQUIPMENT FOR SALE: One U.O.P. center wall up draft heater, two pass arrangement, containing 27 3¾" x 3" x 40' convection tubes, 4 3½" x 2¾" x 40' shock tubes, 7 3½" x 2¾" x 40' hip tubes, and 22 3½" x 2¾" x 40' radiant tubes in each pass, all tubes 7% chrome ½% moly. Unit is complete with tubes, headers, steel work, refractory stock, and breaching, dismantled and ready for shipment. American Liberty Oil Company, Box 1011, Mt. Pleasant, Texas.

Reconditioned Seamless TUBING

1½" O.D.
2" O.D.
2¼" O.D.
3¼" O.D.
3½" O.D.
4" O.D.
5½" O.D.

5 miles or more of each size available in single or double random lengths, plain ends, beveled for welding.
Ideal for gas, water, oil, and air lines.

Write—Wire—Phone

SONKEN-GALAMBA Corporation
2nd and Riverview (X-790)
Kansas City 18, Kansas
THatcher 9243

EQUIPMENT FOR SALE

Model FXZ Gardner-Denver 7¼ x 12 mud pump. Complete mounted on skids. This pump has been completely overhauled and $2100 of new parts installed. Location: Mountain Iron & Supply Co., Plainville, Kansas.
Lee C. Moore S. H. Cantilever Mast with 5-sheave crown block, 45 ft. long base, racking board, catline sheave and extension brackets. This is a 127 ft. mast and can be converted to 97 ft. Location: Mountain Iron & Supply Co., Great Bend, Kansas.

CALL, WRITE, OR WIRE

THE MOUNTAIN IRON & SUPPLY COMPANY
Phone: 7-4238 Fourth National Bank Building Wichita, Kansas

EQUIPMENT FOR SALE

FOR SALE: In the Chase-Russell, Kansas area three 94′ angle iron rotary drilling derricks standing. Cities Service Oil Company, Patridge, Bartlesville, Okla.

FOR SALE: One Bucyrus-Erie 36 L Spudder three and one-half years old. Complete top and bottom tools 15½ to 5½. Also complete tailing in tools. All in first-class condition. List on request. J. E. Griggs, 310 East Third St., Mt. Carmel, Illinois. Phone 959.

FOR SALE: Portable Well Drill, 37 Sullivan Drill, 640 Gal. Water Tank. Both on 42 Ford Trucks. 300 ft. N Rod, Misc. Tools, $5000.00. Gerald G. Shane, Gillette, Wyoming. Phone (022F11).

7500′ OF API Full Hole 4½″ Drill Pipe. Graded and tested by Sonoscope engineers. Milford Giffin, Giffin Hotel, Tel. 477, Hoisington, Kansas.

MODEL S Cardwell draw works powered by W.A.K. Waukesha gas butane motor. Model WS Cardwell mud pump unit consisting of Model 16-P Wilson Snyder 6 x 16 mud pump, and Model 6 W.A.K. Waukesha gas-butane motor; 87′ Lee C. Moore Cantilever drilling mast complete with substructure; 7500′ practically new 2⅞″ drill pipe with tool joints; Drill collars, light plant and all auxiliary equipment including hand tools. Very complete. Available for inspection West Texas. Box E-509, The Oil and Gas Journal, Tulsa, Okla.

Gaso Duplex 4½″ x 6″ Power Pumps with Chrysler C-36 Engines, skid mounted, immediate delivery. Also Byron Jackson, Carter Centrifugal Units. Westinghouse 20-25-50 KW Generating Units.

H. H. COFFIELD
Attn.: W. H. ORR
Phones: 132—Rockdale, Texas
AT-3427—Houston, Texas

SPECO TOOL COMPANY

List your oilfield equipment with us. For trade or sale.
We buy and sell all types of used oilfield equipment.
Oil Field Maintenance & Repair Machine Shops.

Texas representative—James Geurin
3609-33st. Lubbock, Texas
Phone 38711

Salem, Ill. Phone 915 — **Crossville, Ill.** Phone 841

EQUIPMENT FOR SALE

2300′ 5½″ Lapweld Casing 17/20 lb. used, but in good condition. $2.00 ft. Phone 88, Pawhuska—Mr. Hudson.

KEYSTONE spudder, trailer mounted, truck and tools. Located Washington County, Oklahoma. Working on seven hundred foot well. Box E-385, The Oil and Gas Journal, Tulsa, Oklahoma.

SPUDDER BARGAINS!
Cardwell RLGMD, Butane, slick, clean, complete with three strings tools, $20,000.00. Cardwell RLBUD, Diesel, less tools, $16,000.00. Both with 55 foot double poles, both late postwar models, both absolutely A-1 every respect. Will finance two-thirds either or both. Mid-East, Box 253, Fairfield, Illinois.

WANT EQUIPMENT: Did you find the equipment you wish to purchase in this column? If not, use an "Equipment Wanted" classified advertisement to find it. It is available somewhere and Journal classified advertisements will find it. See box heading for classified rates, or write The Oil and Gas Journal.

PRESSURE VESSELS

10,500 gal. 9′x23′x⅞″, 150 PSI.
10,470 gal. 7′x37′, 300 PSI Test.
8,200 gal. 6′x40′x2″, 390 PSI.
3,500 gal. 5′x23′x¾″, 200 PSI. (4)
2,000 gal. 5′x14′, 106 PSI.
1,250 gal. 3′10″x14′, 106 PSI.
1,200 gal. 3′10″x13′9″, 106 PSI.
1,050 gal. 3′10″x11′9″, 125 PSI.

STAINLESS STEEL TANKS

3,000 gal. 5′x21′6″x¼″ Type 430.
2,300 gal. 5′x16′x¼″ Type 304.

TANKS

15,300 gal. 9′x32′x3/16″.
2,100 gal. 9′x3′6″x3/16″ (2).
1,600 gal. 8′x7′x3/16″ (2).
1,100 gal. 5′x7′8″x¼″.

TANK CAR TANKS

6,500 gal. 76″x26′7″, shell 11/16″ & 5/16″.

→ **SEND FOR OUR BROCHURE** ←

HEAT & POWER CO., INC.
70 Pine St., Hanover 2-4890, New York 5
Machinery & Equipment Merchants

EQUIPMENT WANTED

WANTED: R. or R.L. Cardwell double drum spudder in good condition capable of working to 7,000′. Box E-497, The Oil and Gas Journal, Tulsa, Oklahoma.

WE BUY well drilling equipment, machines, cable tools, pipe, etc. Turn your surplus equipment into cash. Pressey & Son, Pueblo, Colorado.

2⅞″ I. F. drill pipe Range 1 and 2 with tool joints. 4¾″ or 5″ drill collars Range 2, 4½″ light weight casing elevators. Contact P. O. Box 730, Bartlesville, Okla.

WANTED: Triplex Type Pumps, minimum 500 barrels per day capacity at 1,000 PSI and 0 to 10 PSI suction and up. 1″ Regular Black Line Pipe; 1″ long collar line pipe and 1½″ upset tubing. Must be in good condition. Lynch Oil Company, P. O. Box 814, Evansville, Indiana.

WANTED: Franks-4500 or 5000 Portable rig. Skid-mounted or trailer-mounted. With drilling accessories and with or without mud pump and drill pipe. Contact P. O. Box 1022, Del Rio, Texas.

EQUIPMENT NOT IN USE: Did you find a buyer in this column for the equipment you have for sale. Someone wants it and an "Equipment For Sale" classified advertisement in the Journal will find a buyer. See box heading for classified rates or write The Oil and Gas Journal

We Wish to Purchase
1950-1951
Bucyrus-Erie Spudder
either a 48-L or 36-L
Keta Gas & Oil Co.
Terminal Building — **Bradford Penna.**

WANTED—GOOD USED DRILLING EQUIPMENT

1—Triple Lee C. Moore, or similar, drilling mast with 7 foot substructure
1—150 ton BJ, or similar, hook
1—150 ton swivel
1—4 sheave 150 ton traveling block grooved for 1¼″ line
1—4¼″ x 40′ square Kelly
1—13⅜″ Shaffer type 39 or 40 double B.O.P.
1—Link belt, or similar, shale shaker

GEHRING EQUIPMENT COMPANY
P.O. Box 2290 — **Casper, Wyoming**

HELP WANTED

NEW HIGH PRESSURE HOSE

Perfect Condition

6 in. diam., 20 ft. long 150 lbs. working pressure; standard nipples and flanges.

Price $200.00 each

4 in. diam., 30 ft. long, 150 lbs. working pressure. Heavy duty standard bronze couplings.

Price $200.00 each

All neoprene, oil resisting with steel coil core. Replacement will cost more than three times the above price. Stock up now while it lasts.

G. Peters

430 Dauphine St.

NEW ORLEANS 16, LA.

HELP WANTED

WANTED REFINERY ENGINEERS

Employment opportunities now available for qualified graduate engineers with an American oil company in South America.

DESIGNERS
Structural, Electrical, and Piping

Five to eight years' experience necessary to qualify. Will be required to draft, design, and check oil refinery installations. Will make field investigations and determine economical practices as well as make recommendations for repairs.

MAINTENANCE ENGINEERS

Two to six years' experience in maintenance and construction division of a refinery or equivalent experience in refinery construction required. Will work in planning, scheduling, and coordination of maintenance and construction.

EQUIPMENT INSPECTORS

Two to five years' oil refinery process equipment inspection experience required. Will arrange and conduct inspections, request equipment renewals due to corrosion, failure, or defectiveness in conformance with accepted safety codes. Will conduct tests of equipment, study causes and prevention of corrosion and failure of metals.

Write giving complete address, age, marital status, and complete details of previous experience. Your reply will be held in strict confidence.

Box 308-M
Radio City Station
New York 19, New York

HELP WANTED

RESEARCH Engineer — 26-40 — B.S., and preferably an advanced degree in petroleum or mechanical engineering. Must be widely experienced in well completion practices. Will be responsible for research program in well completion practices and well mechanics. Salary open. Location — Ponca City, Oklahoma. State age, experience, education, and salary desired in opening letter. Write direct to Personnel Records Division, Continental Oil Company, Ponca City, Oklahoma.

WANTED an experienced geologist who can find oil for an independent oil company operating in the Gulf Coast Area. Box E-495, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED petroleum refinery process engineer with good prior training in both process engineering and plant operation. If you have satisfactory training and experience the position is in line for top job in a Mid-Continent refinery. Box E-488, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Petroleum chemist or treating engineer with two to four years' experience in gasoline treating for technical service with large chemical company selling to the petroleum industry. Position involves considerable traveling in East and Middlewest. Please include details of education and professional experience, as well as a recent photograph, in first letter. Box E-508, The Oil and Gas Journal, Tulsa, Oklahoma.

RESEARCH Group Leader and Research Engineer — 26-40 — B.S., and preferably a Ph.D. in physical chemistry, physics, petroleum engineering, or chemical engineering. Should have experience in reservoir engineering, reservoir mechanics research, or fluid flow research. Will be responsible for research program in multiphase flow and other aspects of reservoir mechanics. Salary open. Location—Ponca City, Oklahoma. State age, experience, education, and salary desired in opening letter. Write direct to Personnel Records Division, Continental Oil Company, Ponca City, Oklahoma.

INTERNAL Auditor for integrated oil company in Mid-Continent Area. Excellent future. Age limit to 45. Public accounting and oil experience desired. Our employes know of this ad. Box E-473, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGISTS with masters degrees having 3 years or under experience. Petroleum Engineers with 1½ or more years well work experience. Experimental geophysicists under 40. Experienced landmen with law degrees under 35. Topographical draftsman. Excellent employer. Good salaries. Experienced oilwell supply storemen, store managers and salesmen. No fees. Tom Robinson, owner Oil Industry Employment Service, 405 Tuloma Bldg., Tulsa, Okla. 4-5974.

DESIGN ENGINEER WANTED

Southern California manufacturer needs a design engineer, experienced in valves and fittings for the Oil Industry. Permanent position with excellent future. Please submit outline of formal training and experience. Mail to Box E-501, The Oil and Gas Journal, 211 S. Cheyenne Ave., Tulsa 1, Oklahoma.

COMPTROLLER EXECUTIVE

Position open with large independent oil producer in Houston area—only those with extensive experience need apply. Excellent opportunity. Box E-271, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM AND ENGINEERING TECHNICAL SERVICE

Petroleum or Chemical Engineer with experience in crude oil production or recovery. Basic chemistry studies desirable.
This is a real opportunity to gain experience in technical service and field development work with a rapidly expanding chemical division of one of America's foremost companies.
Send resume and salary expected to

Manager of Market Development, Armour Chemical Division, 1355 West 31st Street, Chicago, Illinois

HELP WANTED

RESEARCH Metallurgist—26-40—B.S., and preferably advanced degree in metallurgy or metallurgical engineering. Should have experience with all types of laboratory apparatus for metallurgical study and experience in selecting materials for all types of services. Corrosion studies, materials selection, and anlysis of failures will constitute the bulk of the work. Salary open. Location—Ponca City, Oklahoma. State age, experience, education, and salary desired in opening letter. Write direct to Personnel Records Division, Continental Oil Company, Ponca City, Oklahoma.

WANTED—TRAVELING AUDITOR
Excellent opportunity for auditor who is free to travel. Work requires auditing of oil company records in the United States and Canada. Applicant should be familiar with refinery procedures. Yield clerk and typing experience helpful. Must have automobile. Box E-469, The Oil and Gas Journal, Tulsa, Oklahoma.

ENGINEERS, Executives, Technical Men. Salaried positions—$3600 to $30,000. This confidential service for outstanding men who desire a change of connection. Will develop and conduct preliminary negotiations without risk to present position. Send name and address for details. Tomsett Associates, 334 Frick Bldg., Pittsburgh 19, Pa.

KEY Seismograph Personnel Needed by Established and Expanding Seismograph Company. Box E-262, The Oil and Gas Journal, Tulsa, Oklahoma.

THE POSITION YOU WANT: Oil industry companies are looking for men to fill every conceivable kind of position. If you didn't find the position in this column that you are looking for, use a "Situation Wanted" classified advertisement to state your qualifications. Some company is probably looking for your ability. See box heading for classified rates or write The Oil and Gas Journal.

GEOLOGIST

An established Canadian company seeks the services of a geologist between the ages of 30 and 40 with practical field experience to supervise operations in the Caribbean area. Please address replies, which will be treated in confidence, to

Fred Gee,
Temple Building,
62 Richmond Street W.,
Toronto, Ontario.

SITUATIONS WANTED

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No. 131, Ph. No. 131, Hobbs, New Mexico.

PETROLEUM Engineering graduate of Texas A. & M. with seven years field, engineering, and management experience in drilling and production on the Gulf Coast. Box E-478, The Oil and Gas Journal, Tulsa, Oklahoma.

OIL SCOUT and Land man desires change. Knows Rocky Mountain Region in general and exceptionally well informed on Wyoming in particular. Box E-477, The Oil and Gas Journal, Tulsa, Oklahoma.

LEADING rust preventive and specialty lubricant formulator, desires position of chemical director with independent oil company. Age 45. Box E-475, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

SENIOR PROCESS ENGINEER presently employed desires position with better financial return such as stock options, profit sharing. Ten years' varied experience. Box E-507, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST JOB WANTED: B. S. degree Geology, 3½ years geophysical computing with major company. Age 27. Box E-506, The Oil and Gas Journal, Tulsa, Oklahoma.

STATISTICIAN—6 years utility rate work, cost estimates, FPC cases, capacity allocations, economic studies. 2 years design calculations. 1 year steam diesel operation. BS Mech. Eng. Age 32. Box E-485, The Oil and Gas Journal, Tulsa, Oklahoma.

FORMER Independent Oil Operator ten years, with legal education, plus eight years Wall Street experience, desires connection raise funds exploratory well drilling from excess profits taxpayers. Box E-396, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST—Woman with initiative. 9½ years exceptional subsurface experience Texas and Mid-Continent. Unmarried. M. A. —89 hours geology. Desire good position with future. Box E-505, The Oil and Gas Journal, Tulsa, Okla.

REFINERY SUPERINTENDENT, experienced 5,000 to 10,000 bbl. plants, desires connection with independent refinery. Box E-510, The Oil and Gas Journal, Tulsa, Oklahoma.

COMMUNICATION Engineer, Age 37. Now senior engineer with large railroad. Intensive experience with microwave, VHF, wire lines, carrier, and teletype. Capable of handling engineering or administration of any size system. Box E-503, The Oil and Gas Journal, Tulsa, Oklahoma.

LEASE AND DRILLING BLOCKS

OFFER attractive shallow wildcat drilling deal. W. H. Mahon, P.O. Box 821, Brownwood, Texas.

READ Tulsa Oil and Gas Journal Oct. 18, pages 72 & 181, Imperial County, California, 5 year leases (rental paid 3 yrs.) on Geological-Geophysical structures. $200 per 40 acres. Write Main P.O. Box 30, Los Angeles.

FOR SALE: Oil and Gas Leases adjoining producing leases, also wildcat leases, drilling propositions and small producing properties; all in shallow territory. W. P. Harley, Bowling Green, Ky.

DRILLING BLOCK—FOR SALE

About 10,000 acres in leases on semi-proven structure owned by responsible operator in San Juan Basin Area. Full information upon request. Box E-490, The Oil and Gas Journal.

LEASES ROYALTIES
Producing and Nonproducing
Bought and Sold—Any Area
Inquiries Invited

B. D. BUCKLEY
6635 Delmar Ave., St. Louis 5, Mo.

WANTED
OIL INTEREST

I am in a position to furnish oil country tubular goods: casing, tubing, etc., for interest in well for depth up to and including 6,000 ft. Wire or call collect your offer to

DAVID A. SCHLACHTER
6105 Del Norte Lane, Emerson 6026
DALLAS, TEXAS

LEASE AND DRILLING BLOCKS

OIL LEASE — Approximately 800 acres, Beauregard Parish, Louisiana. 585 acres in Section 19 & 30, Township 2, Range 7, 80 acres in Sec. 6, Township 3, Range 8, 105 acres in Sec. 1, Township 3, Range 9. Lands in deep pay area, much activity. All surrounding acreage leased. Personal interviews. Alice Dickinson et al. Tel. 6 R, Lake Arthur, Louisiana, for appointment.

OPERATOR with portable drilling rig, trucks, and other lease equipment, desires connections with financed parties, contemplating water flooding. Prefer shallow area Oklahoma, and Kansas; also have several leases suitable for flooding. Box E-484, The Oil and Gas Journal, Tulsa, Oklahoma.

500-ACRE BLOCK: Carter County, Oklahoma, ready for shallow wildcat test this year. Box E-482, The Oil and Gas Journal, Tulsa, Oklahoma.

WILL pay cash instantly for leases (large blocks), royalties, mineral deeds, production. Write fully—P. O. Box 2153, Denver, Colorado.

FOR SALE: Minerals and leases in Western North Dakota and Eastern Montana. Can furnish choice spreads in several counties. Will also buy acreage where you want it. For complete details write, call or wire Rummel & Stoltz Oil Properties, 736 West Second St., Dickinson, North Dakota. Dial 3771.

CAPITAL immediately available for geologically attractive Drilling deals and oil producing properties. Send full particulars. Box E-434, The Oil and Gas Journal, Tulsa, Oklahoma.

GAS property for sale in Wolf County, Kentucky. Three million feet open flow from twelve wells in the salt sand. These wells are scattered over a large acreage. There is a good market fourteen miles away. This property is on a good road. 2205 Bath Ave., Ashland, Kentucky.

200 ACRE oil lease, need $4,000.00 for a ½ interest to drill well to Arbuckle. Dutcher sand was 100 feet high in this well. Good possibilities. L. Price, Coweta, Okla.

FOR SALE BY OWNER: 60 acre lease in Nowata County, Okla., adjoining successful waterflood. Includes 15 wells, tanks, good central power, 1951 Ford truck with oilfield bed and winch. D. L. Warburton, Coffeyville, Kansas. Phone 1252J.

BUSINESS OPPORTUNITIES

COMPETENT Record keeping, Machinery and equipment inventories. Payrolls, reports within 500 miles of Tulsa office. Replies confidential. Box E-481, The Oil and Gas Journal, Tulsa, Oklahoma.

THREE Drive In Theaters, $350,000.00. Terms. Sound Investment. Will Stand very Closest investigation. Southwest Texas. Reason for Selling, old Roughneck retiring. Made his. Box E-468, The Oil and Gas Journal, Tulsa, Oklahoma.

BRITISH Engineering Company with considerable work facilities doing large business in vessels, pipes and fittings with oil, chemical and steam industries, would be interestd in a manufacturing or selling association with American firm. Box E-502, The Oil and Gas Journal, Tulsa, Oklahoma.

SOUR gas or propylene turned into profits on shares basis. Box E-504, The Oil and Gas Journal, Tulsa, Oklahoma.

MANUFACTURERS representative desires additional line for oil industry. Well established coverage of Oklahoma, Kansas and North Texas. Box E-486, The Oil and Gas Journal, Tulsa, Oklahoma.

WANT
N. Y. EXPORT REPRESENTATION?

Long established and well known oil well equipment manufacturer who has maintained N. Y. export office and sales personnel for many years, is now in a position to handle additional representation in New York for high quality manufacturers of oil equipment items. If you're looking for increased export business, write for further information. All replies held in strict confidence.

Box E-339, The Oil and Gas Journal, Tulsa, Oklahoma

ROYALTIES

MONTANA ROYALTIES
Millions of acres now leased by world's major companies, with huge drilling play in prospect. For booklet describing Montana geology and oil development, write Landowners Royalty Company, Box 1228 Great Falls, Montana.

GET TOGETHER: Both Capital and Royalties are available. If the investment proposition you want isn't listed in this column, use a Journal classified advertisement to find it. See box heading for classified rates or write The Oil and Gas Journal.

REAL ESTATE

HOTEL well equipped, modern, 3 story brick, 42 rooms, 18 with baths, doing good business, located in college town, ranch and farm community. L. C. Larson & Son, Chadron, Nebraska.

LEGAL BLANKS

BURKHART LEGAL BLANKS since 1908. Oil-Gas (all states), Business, Real Estate, Legal Forms, Leases, Revised With Government Regulations, Commercial Printing. Catalog and Samples on request. Burkhart Printing & Stationary Company, 115 South Cincinnati, Tulsa, Oklahoma.

FOR SALE—MAPS

NORTH DAKOTA and South Dakota Base Maps—County outline, Township and Range, location of wells and Operators name with total depths. Oil and Gas Fields. 1" = 8 miles. Price $5.00 each. County Maps: Fee ownership and lease with expiration dates. Scale 1" = 4,000 ft. Northwest Mapping Co., 117½ Fourth St., Bismarck, North Dakota.

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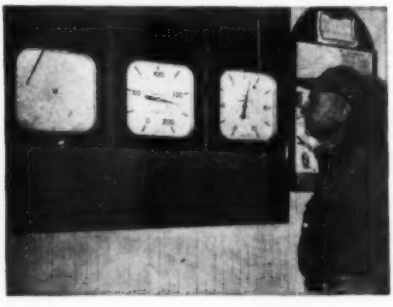
Operating entirely without human attendance is this Union Oil pump station in the Sunset Field near Taft, California.

These Bristol Metameter telemeters transmit readings of temperature, pressure, and flow-rate of the outgoing oil from Sunset Station to McKittrick Pump Station, 30 miles away, where the readings are recorded and indicated on the Metameter Receivers shown below, thus enabling the engineer at McKittrick to keep an eye on Sunset Station.



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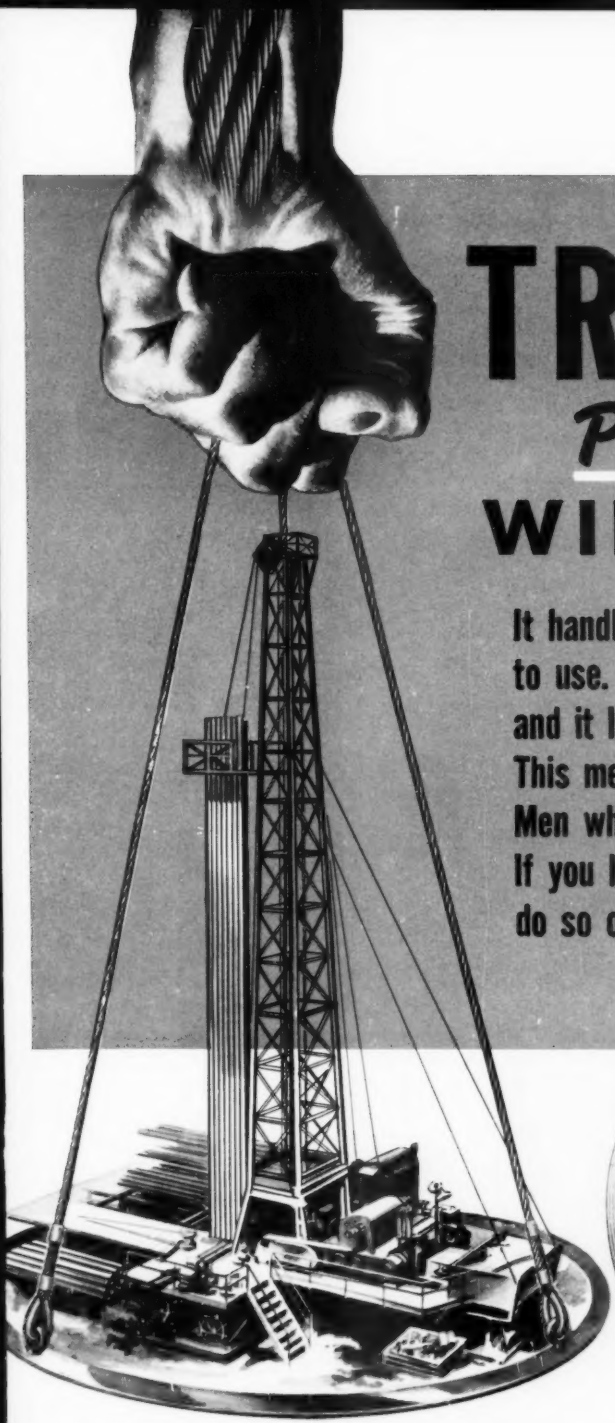

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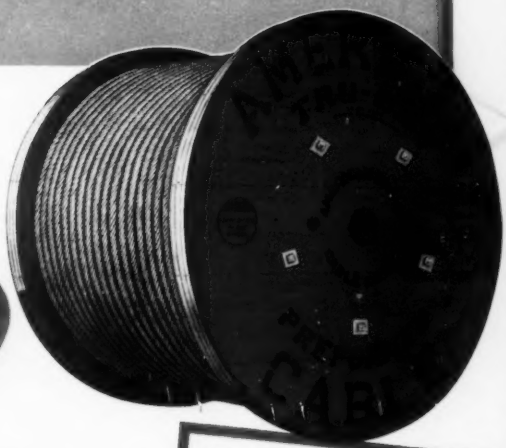

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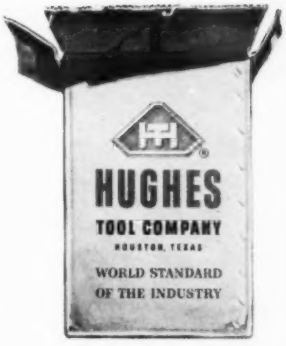
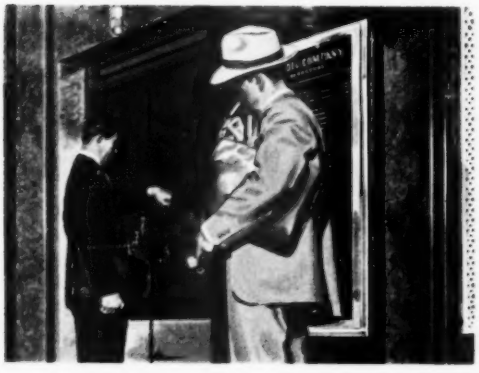
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